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Indexed in the Industrial Arts Index. Published every Thursday. Subscription Price North America, South America and U. S. Possessions, $8; Foreign, $15 a year. Single Copy, 35 cents.

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Cable Address, "Ironage N. Y."

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This Week in The IRON AGE

Vol. 153, No. 22 June 1, 1944

Editorial

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Technical Articles

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Features

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News and Markets

o o o

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Confirms Quality . . . . . Prevents Shop Errors

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Compulsory Maintenance of Customers

WHEN men and women look to the compulsion of law to obtain for them economic ends that can only be won by hard work and merit, they are barking up the wrong tree.

Nearly every one, for example, would like to have a larger income. There are some exceptions to this in this era of confiscatory taxation but they are so few as to negligible. But passing a law to double everyone's income would be as futile as spitting against a hurricane.

Customers must be won by merit and kept by merit. And customers determine the incomes of those who serve them, whether they be doctors, lawyers, employers or factory workers.

In this basic truth, and it is as fundamental and unfortunately as disregarded as are often the Ten Commandments, lies the fallacy of the idea of the guaranteed annual wage.

I do not know any employer who would not be delighted to be able to tell his employees: "Your jobs and your wage rates will stand for the next twelve months." In some few instances and in lines where day in and day out demand has been traditionally constant, it has been possible to do this. But to do it, the employer has to be able to see a year ahead and to know several things with considerable assurance. He has to know that he will have as many customers for as much sales volume next year as this, that productive efficiency will at least remain constant and that unlooked for administrative regulations will not be introduced to hamper his operations.

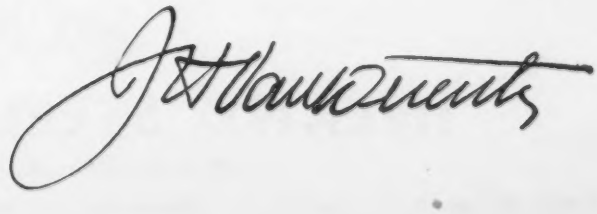
The man who can see a year ahead under today's conditions would indeed be a seer without a peer. He would be several degrees ahead of the celebrated mythical people who "see things under beds that are not there."

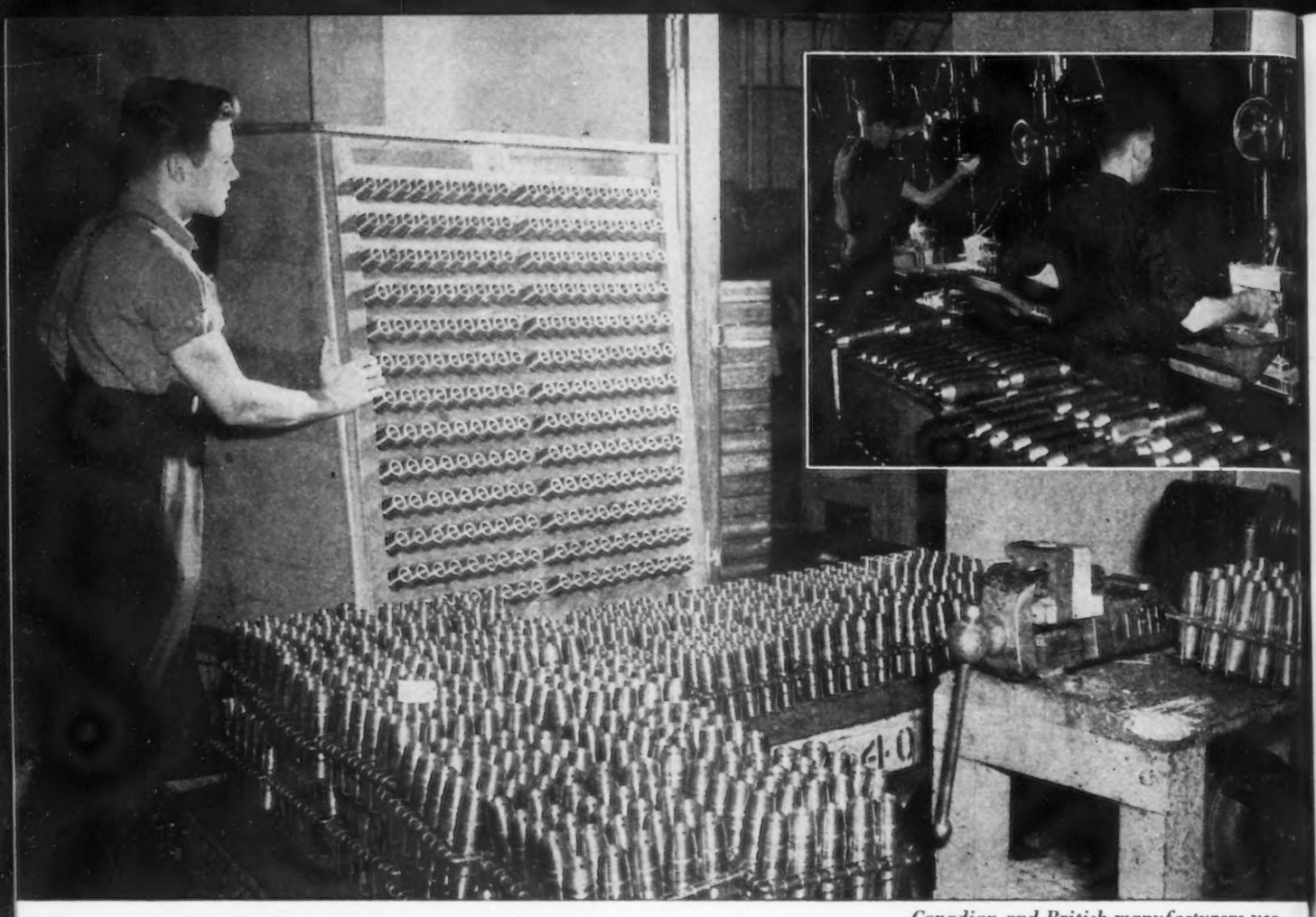
The employer looks under his bed and finds something. Some "Uns," which to him are as bad as finding Huns. *Un*decided Government policies with regard to contract terminations and *un*decided policies with regard to the disposal of the huge prospective surplus of Government bought and owned capital and consumer goods. *Un*decided policies of taxation in the immediate postwar years and *un*decided prospects as to whether he, the National Labor Relations Board, the War Labor Board or the unions are going to run his business.

So, faced with the demand that he guarantee employment for present forces at present wages, he comes back to the meat in the coconut. "Who is going to guarantee me buyers for my product? Is it to be done by law?" Then merit and service and the asset of superior products go out the window. And with them go the urge and the incentive to initiative and advancement.

If, instead of selling products on their merits and thus cultivating and holding customers we are henceforth going to do it by Government fiat and subsidy financed by mounting debt, the honest thing would be to put it up to the electorate. Ask the people of this country at the coming election: "Do you want guaranteed employment? if so there is only one employer who can give it to you and that only as long as the money lasts. And when you accept that you have to accept also State Socialism, Fascism or Communism which are three different labels for the same poison."

Don't be afraid of offending your employer if you choose the affirmative. Most employers are so fed up on administration blunderism that they would be glad to hand their business over and go fishing.





Canadian and British manufacturers use Inland Ledloy to speed war production.

25% Less Scrap
22% More Production
50% Longer Tool Life

—with Inland Ledloy—the lead-bearing, faster machining, low unit-cost steel.

This is only one of the many remarkable war records being made by Inland Ledloy. It is the case history of Ledloy used for the manufacture of 40 mm. shell in a Canadian munition plant.

Experiences like this led to rapid increase in demand for Ledloy before the war. Today, all the Ledloy that Inland makes is going into millions of shell and many parts for war equipment—resulting in faster production, lower unit cost, and great savings in critical cutting tools.

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The IRON AGE
June 1, 1944

NEWS FRONT

► Much of the success of the jet airplane and the newer gas turbines is due to the improvements in the field of special alloys for withstanding dynamic stressing at high temperatures. Specific data on composition and performance are still hush-hush but new types of high temperature testing like stress-to-rupture were developed to find the high temperature load carrying ability of the alloy.

► In refuting the USWA claim that the steel industry can plan its operations so that 75 per cent of its production can be based on anticipated sales, Kemp G. Fuller pointed out that were this possible, it would entail an additional capital investment of a billion dollars for warehouses.

In addition steel companies would run the risk of product obsolescence through competitive, commercial and technological developments, as well as changes in manufacturing processes and equipment.

► The new steel ammunition container production program will take 125,000 tons of steel during its first three months. Although not yet standardized by the Ordnance Department, orders have already been placed for its production.

Since fiber linings will be used, no great savings in paper will be effected.

► Down for the duration which undoubtedly means forever, is Ironton's No. 2 blast furnace which was moved by DPC from Joliet, Ill. This stack has proved impractical, obsolete and virtually impossible to operate continuously.

► West Coast shipyards are expected to try two 10-hr. shifts, which aircraft plants have successfully practised for some time now.

► Marine machinists and riggers at Oregon Ship, Portland, have slashed the time for setting in place Victory ship propulsion machinery from three days to six hours.

► The NLRB has climbed a thorny fence in ruling that while management is forbidden to interfere with the organization of foremen, it is under no compulsion to bargain with any such group once it is organized.

Robert H. Keys, president of the Foremen's Association of America, is known to have talked with many other unions about possible affiliation and support. So far the CIO wants no part of the organization, but once recognition comes to FAA, the CIO might move in to try to gobble up the youngster organization. However, it is giving the foremen passive help.

► Foreseeing a postwar demand for about 65 to 70 million tons of steel a year, Walter Tower suggests using excess capacity to produce steel for export, dismantling such uneconomical or marginal units as have been kept in operation solely to swell wartime tonnages and treating as standby plants those government financed units which private interests do not want to acquire.

► Certain natural graphites added to iron powder gived medium carbon steels, according to Prof. Kuzmick of Stevens Institute Powder Metallurgy Laboratory. Samples are readily obtainable with 0.75 per cent combined carbon, a tensile strength of 150,000 lb. per sq. in., and a hardness of Rockwell C60.

Powder steels with physical properties of this order should find wide application after the war for parts where machining costs are high.

On the other hand, powder metallurgists are looking for increased competition from the cold chamber die casting process and from centrifugal (and precision) castings of the iron and steel class.

► Patent litigation decisions involving metal powders have since 1936 shown a decided trend in favor of the defensive side. It appears, therefore, that the value of patents is very great for defense and less important for offense.

► In the first 12 weeks of operation of the new "mustering-out payment" law, Army has paid $635,000 to 3345 honorably discharged personnel or to their survivors.

► Newspaper reports from Italy frequently mention the use of smoke screens. In one action there, U. S. Chemical Warfare troops, firing 4.2-in. chemical mortars, maintained for 18 hr. a smoke screen 3 miles long and 1000 ft. high.

► So far a total of 73 men in U. S. armed forces have suffered total blindness. The Army furnishes complete care, takes care of re-education and training, and supplies "Seeing Eye" dogs if desired.

Factors in the Development and Selection of

High Temperature

By C. T. EVANS, JR.

Metallurgical Engineer, Universal-Cyclops Steel Corp., Titusville, Pa.

THE discoveries and improvements in the field of special alloys for withstanding dynamic stressing at high temperatures will emerge some day from the secret files as one of the most fascinating and dramatic metallurgical stories of World War II. "Turbo-superchargers," "jet propulsion units" and "gas turbines" have become magic words. There has been a feverish search for the alloys which have made these developments possible.

Like most worthwhile studies these days, the results are a composite of the sustained efforts of many individuals, companies and agencies. Furthermore, the work is progressing on a larger scale than ever before, and will never be considered complete any more than the development of improved materials for room temperature service is ever believed to be a closed book.

It is the purpose of this article to describe some of the metallurgical and engineering factors which enter into the study of superior heat resisting alloys for dynamic stressing. These descriptions must be of a general nature, since specific composition or test information cannot be quoted at this time. The precise data are only available to war contractors and under certain conditions. It is believed, however, that the following comments will in some measure indicate how the problem must be approached, and in this way provide a check list for engineers and metallurgists who may now or in the future be working on structures involving these new materials.

It should be pointed out that the field of "dynamic" loading, with combined radial and transverse forces, is quite different from the ordinary sphere of application of heat resistant materials, about which a great deal is known and which involves the selection of oxidation and/or corrosion resistant alloys to stand up under fairly simple "static" stress systems (furnace parts, oil refinery stills, etc.). Although dynamically loaded high temperature equipment has been in successful service for many years (blowers, steam turbines, etc.), it has been possible to keep both temperatures and stresses within the capabilities of materials which are relatively weak at high temperatures. In contrast, the newer equipment listed below will not perform its function successfully unless it can operate at much higher stresses and/or temperatures than heretofore believed practicable:

(1) Aircraft turbosuperchargers which permit Allied bombers and fighters to fly in the rarefied atmosphere of 35,000 ft. (sub-stratosphere) with the same performance as at sea level.

(2) Diesel engine exhaust superchargers weighing only a small fraction of the engine itself and occupying no critical space but which increase the engine horsepower by 50 per cent.

(3) Jet propelled aircraft with higher speeds and quicker take-off than ever before achieved, plus other military and aerodynamic advantages which are just beginning to be explored.

(4) Gas turbines which have made possible the production of enormous quantities of 100-octane gasoline by a special catalytic process.

(5) Gas turbines for main power drives which, within certain horsepower limits, seem certain to compete successfully with present Diesel and steam power, and which eventually may far exceed the potentialities of these established prime movers. "The first really new kind of power plant in half a century"—since the advent of the steam turbine.

In addition to the above, many kindred projects are in the minds of engineers everywhere. Also worthy of mention are the many improvements which should now be feasible in older designs and processes which were formerly limited because of metallurgical considerations.

The development of the improved alloys seems likely to make many of

Allows for Dynamic Loading

. . . The jet airplane and the newer gas turbines are built on the metals of the turbosupercharger. What are these metals and how are they being developed, and what are the problems involved in heavily loaded alloys in service for long periods of time at very high temperature. These are some of the questions answered herein, insofar as security regulations permit.

these "dreams" possible, but in every instance there must be a thorough understanding of both the engineering and metallurgical problems encountered. The following points summarize many of these factors:

(I) Testing

Fig. 1 illustrates the TEMPERATURE - STRESS - STRAIN - TIME square embodying the more important tests used today in the evaluation of high strength high temperature alloys. These tests, and others, are also listed in the table below:

(a) Stress-to-rupture
(b) Creep
(c) Creep-relaxation
(d) Oxidation and/or corrosion
(e) Effect of temperature fluctuations
(f) Effect of stress fluctuations
(g) Fatigue
(h) Damping capacity
(i) Effect of stress concentrations
(j) Change of ductility with time, temperature, stress and rate of strain
(k) Change of shock (impact) resistance with time, temperature and stress.
(l) Thermal expansion
(m) Thermal conductivity
(n) Density
(o) Changes in microstructure
(p) Changes in hardness
(q) Hot hardness
(r) Short-time tensile, impact and modulus of elasticity.

It should be noted from Fig. 1 that the four factors TEMPERATURE-STRESS-STRAIN-TIME must be considered simultaneously to form the complete pattern. Also, note the inclusion of "Unknown Factors" in the diagram of tests. This is in respect to the many considerations which thus far have defied quantitative evaluation in these complex structures.

There are many modifications and combinations of the above tests. Often they must be performed on a given alloy in many different forms of processing and heat treatment. When summed up, they describe the "high temperature load-carrying ability" of the alloy.

The more important tests include stress-to-rupture, creep, oxidation and/or corrosion. On the other hand, the short time tensile test and hot hardness test have been proven almost worthless in evaluating the service capabilities of high temperature alloys, except for very specialized applications, and are not included in Fig. 1.

Some of the above terms designate relatively new types of high temperature testing, and these are described briefly below:

Stress-to-Rupture

A typical plot is shown in Fig. 2.

At a given temperature, static breaking loads of decreasing size are applied to a set of specimens until it is possible to construct a plot of stress against time for rupture. These tests are seldom extended beyond loads which will produce fracture in more than 2000 hr. Ordinarily, three or four points up to 1000 hr. are sufficient.

Changes of ductility and impact with time can be measured in the ruptured specimens. Usually periodic strain measurements are made on the specimens stretching under the lower loads, so that accelerated creep data are obtained.

When the stress-rupture time relationship is plotted on log-log coordinate paper, a straight line is obtained which has changes in slope only if some structural or surface instability of the alloy occurs. Such instability may or may not be serious but the detection of these points is one of the most useful features of the test.

Creep-Relaxation

A typical plot is shown in Fig. 3.

This test yields data directly applicable to high temperature bolts. A plot of strain against time is constructed

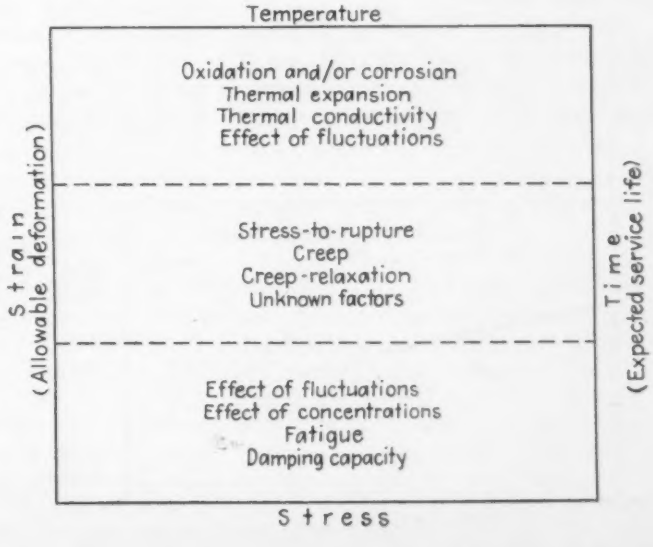


FIG. 1—Tests used in the development and selection of high temperature alloys for dynamic loading.

in which a single specimen of the alloy at a given temperature receives a series of loads which are decreased every time a predetermined constant strain is reached. This strain corresponds to the initial bolting stress to which the stud will be "pulled up" at room temperature.

It may be seen that a series of secondary creep rates are obtained which can be plotted against stress on log-log coordinate paper. A straight line with a definite slope is produced and a mathematical formula derived by E. L. Robinson of the General Electric Co., Schenectady, permits the calculation of the residual or relaxation stress which will remain in the bolt at temperature after any given time period.

A successful high temperature bolting steel requires an unusual balance of creep resistance and ductility. The creep-relaxation test yields a great deal of valuable information concerning the load-carrying characteristics of an alloy.

Creep

Fig. 4 illustrates a typical creep curve. This test has been universally used in high temperature work for many years but should be discussed here for completeness.

In contrast to stress-to-rupture and creep-relaxation testing, the stresses used for creep tests are quite low and most creep tests do not stretch the specimen beyond the second or "flat" stage of continuous flow. When the stresses are increased to produce the third stage of creep, and hence fracture, within reasonably short time periods (2000 hr. or less) the test comes within the category of stress-to-rupture testing.

Creep test units are constructed so that strain measurements can be taken taken very accurately.

Damping Capacity

This appears to be an inherent characteristic of each material, and is sometimes described as the "logarithmic decrement." In plain language, it is the ability of an alloy to cease vibrating through internal molecular friction.

Since alternate pulsations, particularly associated with partial admission turbines, can build up to very high vibrating stresses, the ability of a material to "damp out" quickly would seem to be of considerable importance.

There are several ways of measuring this property, the most popular utilizing a simple "tuning" fork.

(2) Selection

Sometimes all of the above tests (and more) must be performed on an alloy to qualify it for a given application. In other instances, a few tests may be sufficient. At all times it is essential that the TEMPERATURE-STRESS-STRAIN-TIME test relationships approach the expected service conditions as closely as possible.

When sufficient creep and stress-to-rupture data exist, it may be possible to construct a series of design curves in a plot of the type illustrated by Fig. 5. This scheme gives the designing engineer quantitative working information, and was first demonstrated to the writer by N. L. Mochel of Westinghouse Electric & Mfg. Co., Essington, Pa. The "transition point curve" is plotted from the stresses and corresponding times where the creep rates increase to 10 per cent above the secondary rate (indicating the beginning of the third stage of creep).

In many structures, conditions may be so complicated that the only recourse is to select a material or materials qualitatively from standard tests, build a test or "mock-up" unit and run it under service conditions. This test should be run as soon as it is possible to make a tentative choice of materials. It is the only way in which the "Unknown Factors" of Fig. 1 can be determined, short of actual service experience.

No single alloy has been found which has all the ideal characteristics at all the temperatures which may exist in most units. Even the more outstanding compositions can only be considered superior to other alloys over a relatively narrow temperature range.

At a given temperature, one composition may be superior for high stresses service and a totally different alloy outstanding for service where the stresses can be kept low.

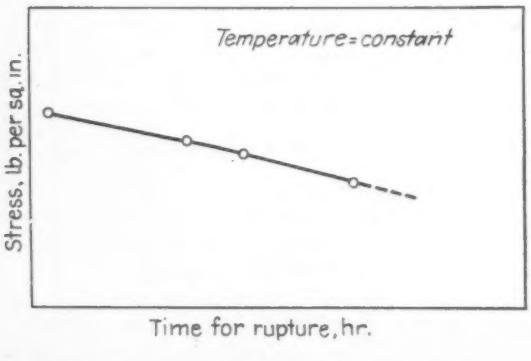
Likewise, the time element is of extreme importance. Materials suitable for 1000-hr. service life may be totally unsuitable for 100,000-hr. service life.

(3) Availability

Suppose that after thorough testing and consideration of the various selection factors there is found a material which appears to "fill the bill" for a given part of the proposed structure. Can that material be obtained commercially in the form and quantities in which it is desired? Can it be fabricated commercially? Wherever possible these questions should be answered *before* the testing is actually begun and certainly before any actual units are constructed.

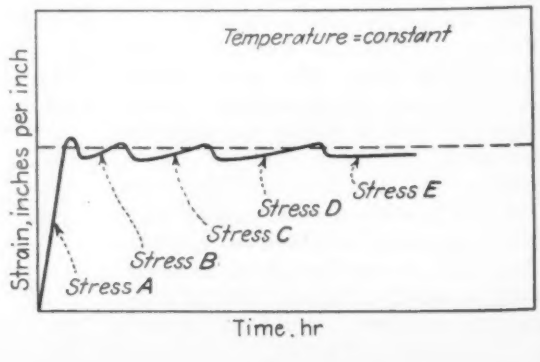
Many difficulties may be encountered in producing these high strength high temperature materials into the desired forms. These can be understood when it is realized that working these materials in normal hot working ranges is nearly equivalent to working low-alloy steels absolutely cold.

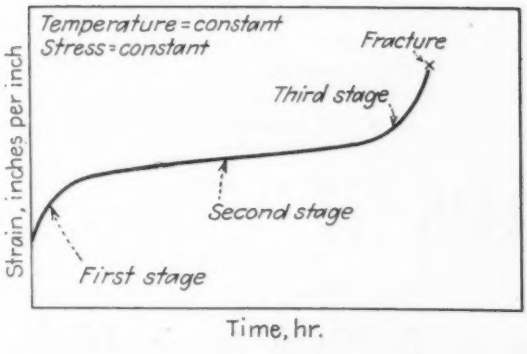
However, under the spur of important war developments, many ingenious processes have been devised, and to the writer's knowledge no project is being held up at the present time for lack of the "raw materials," although sometimes it has not been practicable to obtain either the exact shapes or the maximum working in the alloys desired. Detailed problems of fabrication cannot come within the scope of this discussion, but it can be stated that here again American industrial genius has triumphed over many obstacles, and the continual introduction of new



RIGHT
FIG. 3 — Typical creep - relaxation plot.

LEFT
FIG. 2 — Typical stress - to - rupture plot.





RIGHT
FIG. 5 — Typical design curves.

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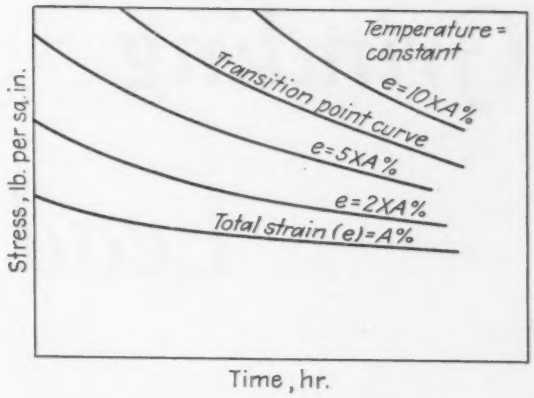
LEFT
FIG. 4 — Typical creep plot.



processes, particularly in the field of welding, indicates that there are no major problems in sight which will not be eventually solved.

Also, many of the outstanding alloys need never be hot worked at all. Where small parts such as blading, are involved, these metals can frequently be cast into the desired shapes. Especially for very high temperature service, these castings have superior properties to the best wrought materials. The "lost wax" or "dental investment" precision casting process (THE IRON AGE, Feb. 10, 1944) appears to be very successful for this work.

Under this heading also must be mentioned alloying element availability, since many of these compositions contain large percentages of strategic constituents. This consideration has emphasized the testing of steels containing relatively low total alloy contents, and it has been found that over certain temperature ranges some of these grades are actually superior to much more highly alloyed compositions.

(4) Effect of Size and Processing Variables

This subject should possibly have been discussed under "Testing" but deserves special emphasis. Since most of these high strength heat resisting alloys will not respond to heat treatment in the ordinary sense, the manner and section in which they are worked has a profound influence on the resulting properties. All the factors cannot be discussed here, but this subject is of the utmost importance and is receiving an increasing amount of study.

The following points are rather obvious, but are nevertheless significant:

(a) Alloys which show relatively high strengths in small sections will show relatively high strengths in large sections.

(b) The weaker properties of the large sections are most evident for short time periods and very high stresses. The preliminary long-time data on large sections, properly manufactured, are quite encouraging.

When all of the above factors are considered, it is not surprising that progress in the field of high strength heat resisting alloys for dynamically loaded structures has not been rapid. In fact, many of the more promising alloys which exist today were actually developed prior to the war, and it is only recently that their full capabilities have been recognized and applied.

Unquestionably, the war, per se, has been a tremendous spur to these developments. Various government agencies are sponsoring comprehensive research programs which have had a far-reaching influence in coordinating and assembling data in addition to accomplishing a substantial share of the complicated and costly testing which is required. These programs have had the wholehearted support and cooperation of private industry.

There is good reason to believe that there will be an increasing number of successful new basic power developments involving high strength high temperature alloys. Obviously, the metal maker's part in this work will be large, but the foregoing is intended to show that here again success cannot attend unless both the designing engineer and metallurgical engineer work very closely together in considering the many complex factors in their proper proportions.

Spatter Proof Liquid Serves Dual Purpose

IN the fabrication of welded steel bases which are designed with numerous ribs, the cleaning of weld spatter at the Republic Structural Iron Works, Cleveland, was a considerable item in labor costs. This problem was solved by using a spatter proof liquid called No-Spat. At first it was brushed on the steel, covering about 2 in. on each side of the arc weld. In an attempt to speed up this operation, Alex Dawson, welding foreman, developed a homemade spray device and accidentally stumbled on an idea that saved 40 per cent in cleaning time after stress relief heat treatment at 1200 deg. F.

Obviously when the steel base was sprayed, a larger surface was covered by the No-Spat liquid. Dawson noticed that surfaces covered by this spatter proof compound left the mill scale much looser on the steel and the oxide film was much easier to remove. As a result, all steel structures are sprayed completely with No-Spat before and after welding. Even though they may remain in an open yard for several days waiting their turn to go into the furnace, the surface is protected from rusting. Instead of the usual 3 hr. cleaning time per base after heat treatment, the time has been reduced to 1¾ hr. Furthermore a much cleaner and smoother surface is left to receive the priming coat of paint.

The spraying device was made by cutting a ½ in. pipe part way with a hack saw and bending it at 90 deg. One end is attached to a piece of rubber hose connected to the shop air line and the other end is pushed through a cork in the mouth of a bottle containing No-Spat liquid. This forms a simple type of aspirator. The atomized liquid is sprayed through the break in the pipe.

Grinding Lead Screws

Accurate to 0.0002 In. in 16 In.

. . . Not everyone talking about accuracy actually achieves it. This article describes the elaborate techniques worked out by the author's company over a period of years to achieve the ultimate in accuracy in the manufacture of micrometer screws for a small jig borer. Highlight of the method is the use of an electronic thermostat to maintain the temperature of the coolant and hence the work at a constant differential with respect to the master lead screw of the thread grinder. In the second and concluding part of the article, unusual methods of checking the product are illustrated.

o o o

By J. R. MOORE
Secretary, Moore Special Tool Co., Inc., Bridgeport, Conn.

o o o

THREE distinct methods or principles of linear measurement are commonly used in machine shops and toolrooms:

1. The graduated scale
2. The size block or end measure
3. The precision lead screw or micrometer screw.

All three methods have their advantages and their disadvantages. All three have been used in machine tools.

The scale has the advantage of not being subject to wear. However in working to "tenths," extremely fine lines must be used, requiring optical provision for reading. In the average shop, this is not only slow but impractical because of the exacting strain placed on the operator.

The end-measure method will produce accurate results provided all conditions are right, but these conditions are many:

1. Blocks alone are insufficient. A micrometer screw must be used to break up the inches into "tenths" and a dial pressure indicator to keep constant pressure on the end measures.
2. End measures are subject to expansion or contraction from temperature variations and therefore must be maintained at constant temperature.
3. Contact between blocks must be perfect, inasmuch as the smallest particle of dirt will alter the setting. This condition is difficult to achieve because dust and abrasive particles cannot be avoided when drilling, boring or grinding.
4. The end-measure method is more complicated and requires more skill than either of the other two methods.
5. It is the slowest because of the many motions required for a single setting.

Lead screws on the other hand, are fast to set, accurate and so simple to read as to eliminate human errors and the need of great skill. Enclosed in the body of the machine, they are not subject to temperature fluctuations affecting exposed blocks or scales. However, to obtain good results with lead screws, the screws and their mating nuts must be made to the highest possible standards of refinement. Neither milled threads or threads chased in a lathe will produce sufficiently accurate leads or good enough surface finishes for high precision measuring. Besides, soft lead screws would wear too fast. This leaves one alternative—use of hardened, thread-ground screws.

In this country, the Moore Company pioneered the use of the thread-ground lead screw as a measuring device in a machine tool about 12 years ago, Fig. 1. Any question of the soundness of the principle of measuring with lead screws was soon dissipated. Table settings are made rapidly and accurately. The wear problem is overcome by hardening. Tests made on lead screws of Moore machines in constant use for five or ten years show that the wear is negligible.

Having established these facts, the Moore Company undertook the job of producing the most accurate lead screws possible. As the result of a thorough study of the problem and the development of new techniques to solve it, today lead screws ground in the Moore plant are accurate to 0.0002 in. in 16 in.

Effect of Temperature

One of the major phases is that of temperature control. The importance of this is readily recognized when it is realized how much effect a slight deviation in temperature will cause. A piece of steel 10 in. long expands approximately 0.00006 in. for each degree Fahrenheit of temperature rise. Differences of 5 or 10 deg. barely perceptible to the feel of the fingers, cause dimensional changes far greater than the tolerances allowed in the finished work.

This temperature deviation effect appears in many places—on the workpiece during processing, on the machine in which the grinding is done, on the finished workpiece and on the checking devices. These effects are

so interrelated that none can be considered independently.

In the schematic view of a thread grinder, Fig. 2, it will be seen that the work spindle and the master lead screw are geared together, causing the workpiece to advance and rotate at the same time. The idea is similar to the gearing in a lathe; the chief difference is that in the thread grinder, the workpiece advances, while in a lathe, the carriage advances. It is readily seen that the pitch or lead of the master screw definitely controls the pitch of the workpiece being ground. Any pitch errors in the master lead screw are immediately reflected in the workpiece.

There are two general types of error in the master lead screw of a thread grinder—errors created during the making of the screw and *those subsequently introduced by changes in its temperature.*

The first type, the error created in its manufacture, is of some importance, and of course, must be compensated for. This will be dealt with later in the article.

The second type, that of subsequent temperature changes, is of far greater importance, and is the type of error which has apparently been neglected in all previous attempts at precision lead screw grinding. Previously, it has been thought that, if the work is ground in a constant-temperature room, with coolant supplied at approximately room temperature, conditions would be satisfactory. In some cases observed by the writer, the coolant was merely "cooled," without regard for accuracy of control. In other words, previous attempts at accurate lead screw grinding have *neglected the one cause of error which, although the least obvious, is the most troublesome.*

The frictional heat developed by driving motors and gearboxes, and the friction between the lead screw and its nut conspire to raise the temperature of the screw. The writer has observed cases where this temperature has risen as much as 20 deg. F. above room temperature, expanding a lead screw with 20 in. of thread length 0.0025 in.—an almost unbelievable amount when dealing in tenths. This error is transferred to the workpiece proportionally to its length. A work-

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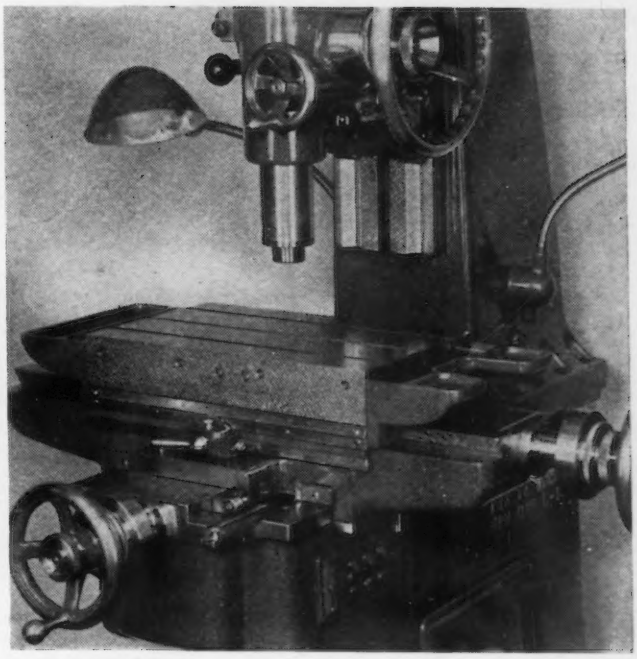

FIG. 1—The use of accurate lead screws is exemplified in the Moore jig borer which uses dials for reading table settings. With precisely made lead screws this method is claimed to be the fastest, most accurate and simplest system now available for making accurate table settings on small machines.

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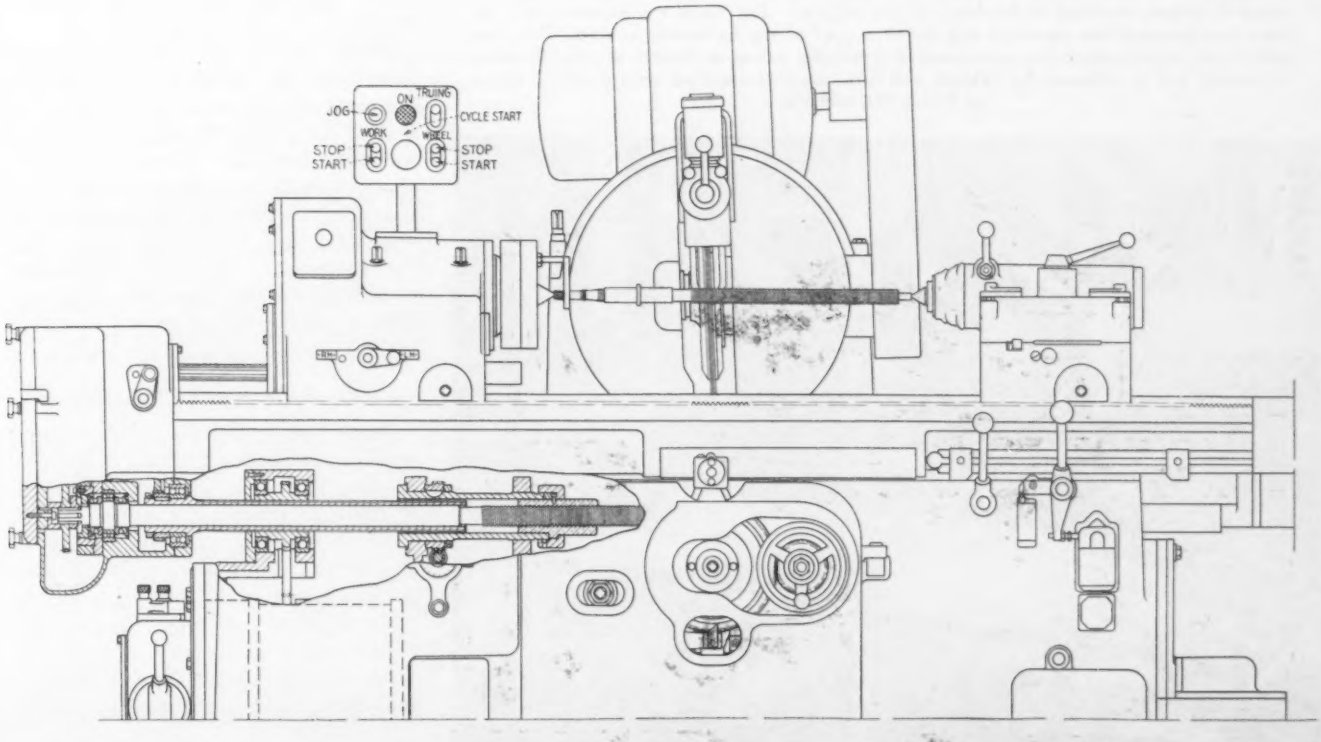
FIG. 2—Basic elements of thread grinder, showing master screw geared to work spindle and controlling longitudinal movement of headstock. Pitch of master screw directly controls lead of workpiece being ground. Errors in master screw are reflected as lead errors in workpiece.

(Courtesy Jones & Lamson Machine Co.)



piece with 16 in. of thread length, ground at room temperature, will have an overall pitch error of approximately +0.002 in.

Compensating Temperature Changes

It is now evident that any attempt to solve the problem merely by working in a constant-temperature room or maintaining the coolant at an arbitrary constant temperature would be fruitless, since the major source of error would not be taken into account.

There are various means of compensating for changes in temperature of the master lead screw of the thread grinder:

1. Using gearing to change the effective lead of the master screw
2. Making the master lead screw shorter in the first place
3. Warming up the workpiece through the medium of the coolant.

Although either of the first two methods can compensate for a known, fixed error, neither takes care of temperature fluctuations.

The third method is worth investigating, since the temperature of the coolant can be varied to take care of the fluctuations. By way of example, suppose we are operating under conditions where the master lead screw is 20 deg. F. above room temperature. The pitch error in the workpiece will then be plus 0.002 in. approximately. However, if during the grinding the workpiece is held at the same temperature as that of the master screw, it will shrink when subsequently cooled. Furthermore, it will shrink the correct amount, provided the coefficients of expansion of the master lead screw and the workpiece are alike.

Therefore we devised a means of matching the coolant temperature to that of the master screw. We could then flood the workpiece with the assurance that it would shrink to proper size when cooled to room temperature.

This method is not entirely successful, however, since it is impossible to keep the workpiece constantly flooded. Inspection for finish, thread form and pitch diameter necessitate stopping the flow of coolant and sometimes removing the workpiece from the machine. During these periods it is out of the influence of the warm coolant, and the air in the room immediately drops its temperature. The warm coolant and the cool air in the room constantly oppose each other. As a result, the workpiece is not held at a constant temperature, and the lead of the finished workpiece is not uniform.

There is a definite advantage, therefore, in keeping the coolant temperature as near as possible to that of the room. In order to do this, we can either use a master lead screw about 0.0025 in. short, or we can shorten its *effective* lead in small increments by manipulation of the change gears. Since it is impossible to purchase a standard thread grinder with a short-pitch master screw, the logical solution is to change the gears.

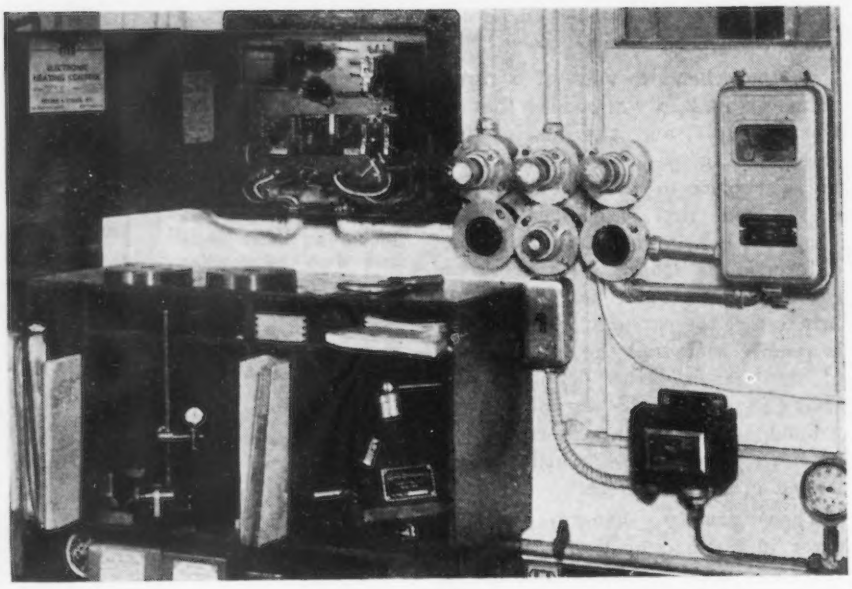
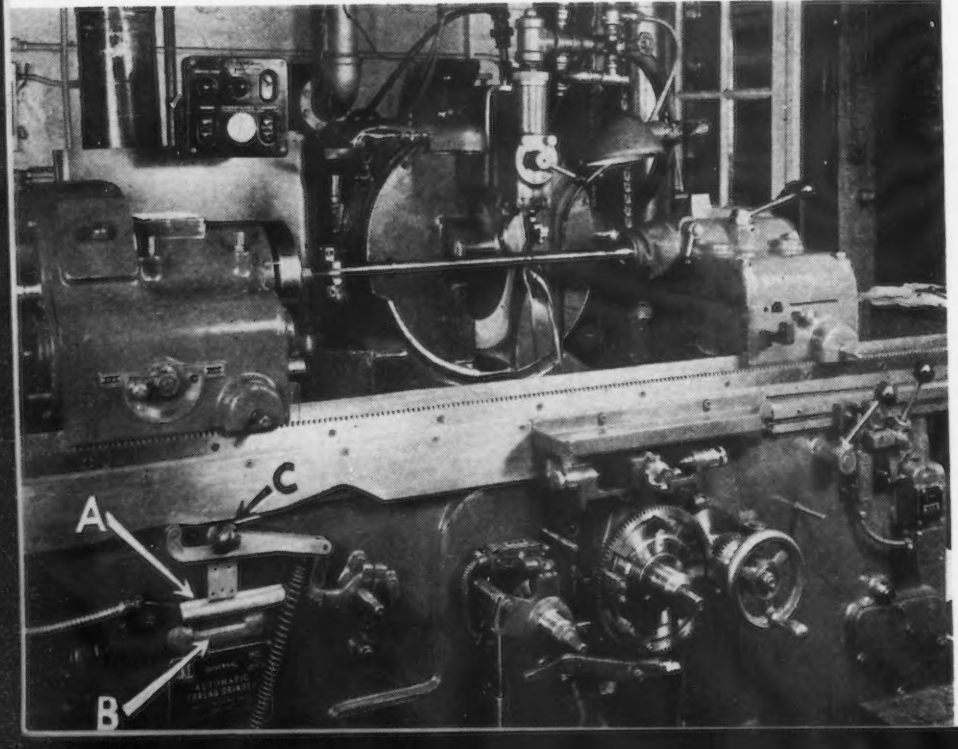


FIG. 3—This electronic thermostat correlates the response of two resistance thermometers, holding the coolant at any predetermined temperature differential with respect to that of the master screw of the thread grinder. Electric timer at right holds down running time of compressor to prevent "coasting" to too low a temperature.

FIG. 4—Resistance thermometer attached to base of thread grinder at *A* measures temperatures of the master lead screw with sufficient accuracy at this point, since the screw is entirely enclosed in the base of the machine. The visual thermometer *B* is for the convenience of the operator and is not a part of the automatic control. This view also shows arrangement for compensating aperiodic errors in master screws. Rotation of master nut is achieved by linkage and lever against serrated cam plate *C* above resistance thermometer.



Pitch Change by Gearing

Since the principle of achieving small increments of pitch change by gearing is not well known, it would be well to describe it by a specific example. The thread grinder used is a standard Jones & Lamson 12 x 45 in. machine, with an 8-pitch lead screw. There are four change gears in the ratio, arbitrarily called *A*, *B*, *C*, and *D*. These letters are also used to represent the number of teeth in each

gear. The formula for the lead to be ground on the workpiece is:

Lead = 2/5 x change gear ratio

or

Lead = 2/5 x A/B x C/D

A suitable gear ratio to grind 8 thr. per in. on the workpiece might be:

lead = 2/5 x 40/80 x 60/96

= ⅛ in. = 0.125000 in.

A suggested gear combination to shorten this lead might be:

lead = 2/5 x 63/50 x 31/125

= 0.12499200 in.

Multiplying by 8 thr. per in. makes the effective pitch of the master screw 0.999936 in. per in. Suggested gear ratios for shortening the effective lead still more are these:

26/63 x 53/70, which will produce an effective lead of 0.999909270 in. per in.

or 30/97 x 98/97, which will produce an effective lead of 0.99989371 in. per in.

It can be seen from the above that it is possible, by manipulation of the change gears, to change the effective pitch of the master lead screw in small increments. If it is warmed sufficiently to cause it to expand approximately 0.0001 in. per in., its *effective* pitch can be brought to nearly standard by either of the above two ratios. Since its effective pitch is now nearly standard, the workpiece can be ground at room temperature, without the necessity of subsequent cooling to reduce its lead. The coolant can be kept at approximately room temperature.

This would be satisfactory if it can be assumed that operating conditions are always uniform. Unfortunately, they are not. Stopping and restarting the machine when setting up, inspecting the work and making adjustments cause *fluctuations*, which must also be accounted for. It is necessary, therefore, to have an automatic means of changing the temperature of the coolant in accord with changes of temperature of the master lead screw. (Since the coolant contributes the major part of the control over the workpiece, it can be 2 or 3 deg. above or below air temperature without fear of any serious conflict between them.)

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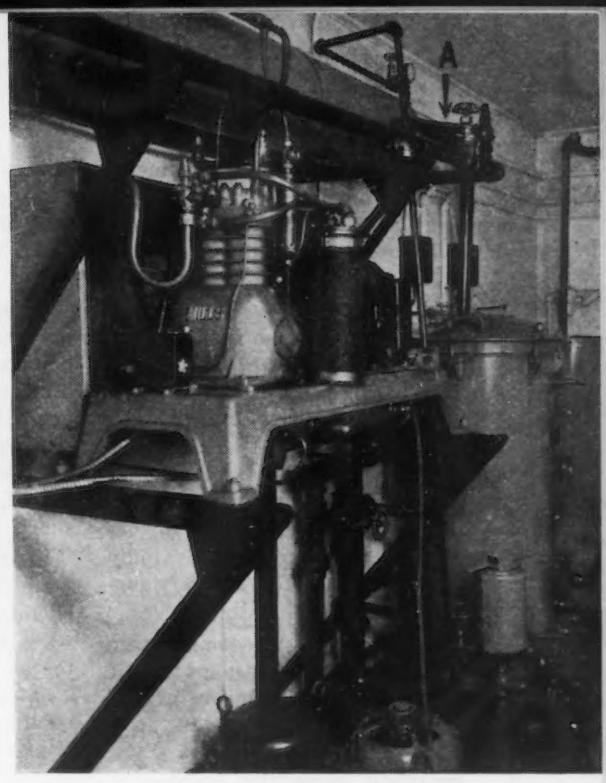

FIG. 5—With the two pressure filters at the right, all of the coolant supplied the lead screw grinder is filtered to eliminate the danger of scratching the workpiece with dirt particles. Arrow points to approximate location of resistance thermometer in coolant line at end of heat exchanger. This thermometer constantly measures the temperature of the cooled liquid.

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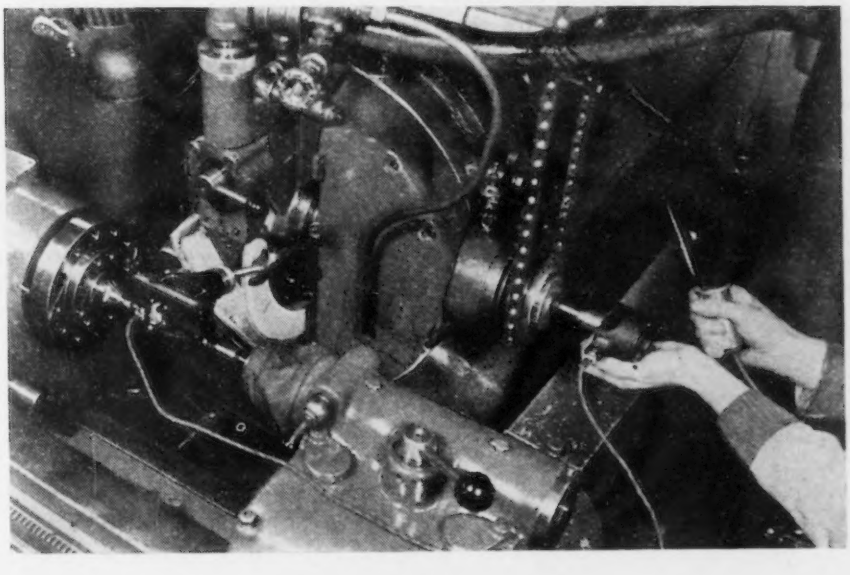
As the temperature of the master screw rises, the coolant temperature must also be raised, and vice versa.

Electronic Thermostat

An ingenious electronic thermostat was found to accomplish this, Fig. 3. Two resistance-type temperature measuring devices are used. One is attached to the base of the thread grinder, Fig. 4, in close proximity to the master lead screw. Since the temperature of the master screw follows that of the base very closely, readings taken at this point are sufficiently accurate for the purpose. The other resistance unit is in the coolant supply line, at a point where the coolant leaves the heat exchanger, Fig. 5. Each element contains a low voltage resistance wire, the resistivity of which varies with changes in temperature. The electronic thermostat correlates the two temperatures as measured, and through a relay starts or stops the refrigerating system as required. The thermostat is adjustable by the control knobs shown in the photo. It has a range of adjustment of about 20 deg. each way.

Considerable experimentation is required to ascertain the proper temperature differential. It must be adjusted to meet varying conditions. For example, for fine finishing and with the proper gearing in place, it is usually found that the coolant temperature should run somewhere between 15 and 20 deg. below that of the master screw. If the correct value is found to be, say, 18 deg., the controls are set so that the thermometers register this difference. Now, if the base thermometer reads

FIG. 6—Dynamic balancing of thread grinding wheels is accomplished with the setup shown, using a Davey Vibroscope. The stroboscope (right), flashed synchronously with rotation, indicates the direction and amount of correction required. Balancing weights are shown in the wheel holding flange. In order to make the test sensitive enough to register a readable amount, the spindle housing floats on springs during this operation.



93 deg., the coolant thermometer should read 75 deg. If the base thermometer drops to 90 deg., the thermostat will automatically drop the coolant to 72 deg., which can immediately be read on the coolant thermometer.

It may be noted that refrigeration is used on the coolant, but that no reference is made to a heater. All the coolant supplied must be filtered, and the friction of the oil through the pumps and the pressure filter supplies more heat than is required. Filtering is through diatomaceous earth deposited upon wire screens. The only control, therefore, is on the refrigerant.

Another phase of the temperature control problem is a consideration of factors affecting the temperature of the workpiece itself.

Grinding Generates Heat

Rough grinding, due to the high rate of stock removed, generates more heat than finish grinding where only a few "tenths" are removed per pass. This heat must be absorbed by the coolant, and it is, therefore, necessary to supply the coolant at a considerably lower temperature in order that the resultant temperature of the workpiece is correct. Considerable experience and skill are required to judge just what temperature should be used here. Often the coolant is run at 20 deg. below the master screw during the roughing stage; with this differential, the coolant absorbs just about enough heat to keep the workpiece at its proper temperature.

During finish grinding, every precaution must be taken to keep the workpiece within ± 1 deg. of the proper temperature differential. The dead center on the tailstock end must be generously flooded at all times; otherwise the friction of the rotation at this point sometimes warms up 2 or 3 in. of the dead center end of the piece, causing serious trouble.

The wheel dressing diamond must be kept sharp to assure clean-cutting grinding action. When they become dull, the wheels glaze and fill quickly, heating the work. This additional heat results in short and non-uniform leads. When the diamonds are worn to a flat about 0.005 or 0.006 in. across, they should be discarded or resharpened. This is a matter entailing considerable expense, since the diamonds remain sharp for only about 20 hr.

Grinding wheels and all rotating parts of the machine must be dynamically balanced and free from vibration. If the grinding wheel does not balance, all the work load is carried by a small portion of the wheel. This portion soon becomes dull and glazed, resulting in production of short, non-uniform leads.

Static balancing of the grinding wheel is not sufficiently accurate. If balanced dry, the balance changes when the coolant is added, since different parts of the wheel absorb greater or lesser amounts of coolant, resulting in imbalance. If new wheels are balanced before being dressed, the diamonds remove different amounts of material from different parts of the periphery, resulting in imbalance.

Dynamic Balancing

The only satisfactory way to balance the grinding wheel is to balance it dynamically, after dressing, on the same spindle on which it will be used, and with the coolant actually flowing on it. An arrangement for doing this is shown in Fig. 6. A vibrometer with a stroboscopic phasing device is used. The vibrometer is held between the work centers of the machine, its contact point touching an arm attached to the spindle housing. During the balancing operation the spindle housing is isolated from the main wheel slide by springs, allowing it to "float" and vibrate from the effect of the imbalance. The heavy side of the wheel is indicated by the stroboscope. The balancing weights are adjusted until the displacement is less than 0.0002 in. The cap screws holding the wheel spindle to the wheel slide are then tightened. The resulting vibration is now found to be too small to show any reading on the vibrometer! The springs on which the spindle floats are left permanently in place, but except when performing the balancing operation, they are out of action. During grinding, the cap screws are tightened, holding the wheel spindle firmly to the machine.

To minimize any pulsations in the vertical belt pull, the vibroscope is placed so as to measure only the horizontal component of the imbalance.

Correcting Aperiodic Errors

So far, only the errors caused by thermal expansion have been discussed. If the master screw could always be made perfectly uniform in pitch, this would be the only type of error necessary to compensate. There is another type, however, mentioned earlier, but not discussed. The master lead screw is a long, heavy piece, and the problem of grinding it is that of a small piece multiplied many fold. The master lead screw, therefore, is almost certain to have some error, or non-uniformity of pitch. Although it may be accurate from one end to the other, it will probably have places in it where the pitch is too long, and other places where it is too short. This type of error is called aperiodic, and is compensated in the following manner:

The standard thread grinder is equipped with an adjustment for "picking up" a thread already roughed, or partly ground, because the grinding wheel must follow exactly the same path as the original thread on the workpiece. To do this, the workpiece is shifted axially while rotating. In the Jones & Lamson thread grinder, this is accomplished by rotating the nut in which the master screw runs. A worm geared shaft, equipped with handle and dial, protruding from the front of the base of the machine, is provided for this purpose.

A compensator of our own making was devised to work in conjunction with this (see Fig. 4). A cam plate *C* cut with the proper serrations is fastened to the table of the machine. Form of serration is determined by plotting average errors of a large number of workpieces. A lever and linkage follow the serrations, transmitting rotation to the nut, forward or backward, as the case may be, compensating the errors in the screw.

[In the second and concluding part of the article, the author will describe and illustrate methods and equipment especially devised for checking highly accurate lead screws.]

Carbine Sight Made From Brazed Stampings

THE front sight for the cal. 0.30 carbine is now being made from rolled and stamped pieces that are brazed together instead of being machined from a solid forging. Cost is 45c. compared with 85c. for the forging. Only press dies and forming equipment are needed for the redesigned sight. As shown in the drawing, the assembly consists of three pieces—the blade, the saddle or base and the guard.

As manufactured by the Prestole Division of the Detroit Harvester Co., Toledo, the blade is made on a progressive die from strip stock. It is blanked, coined to fit the slot in the saddle, shaved and ejected. One blade is completed at each stroke of the press.

The saddle is made from wire of rectangular section which is fed through a set of rolls and has a shallow V-shaped groove formed on one face. After being cut to length in a press die, the individual saddle pieces are fed into a press which coins the keyway slot in the bottom of the V. In the middle of the groove a semicircular depression is formed to provide clearance for a cross drill in machining the assembly. To give a press fit for the blade in the saddle, a slot is milled in the bottom of the keyway and the blade is assembled to it by means of an air operated fixture.

Four progressive press operations are required to complete the guard. This includes blanking and piercing, embossing and forming, the latter in two strokes. Saddle with blade attached is then assembled to the guard in a jig which establishes the correct relationship between parts. There is enough spring in the guard to hold the saddle in place preparatory to spot welding in a fixture which accurately establishes the final critical dimensions. Copper wire is looped through the guard to form the braze which is obtained in a controlled atmosphere induction furnace of unusual design.

In the induction hydrogen furnace,

(CONTINUED ON PAGE 134)

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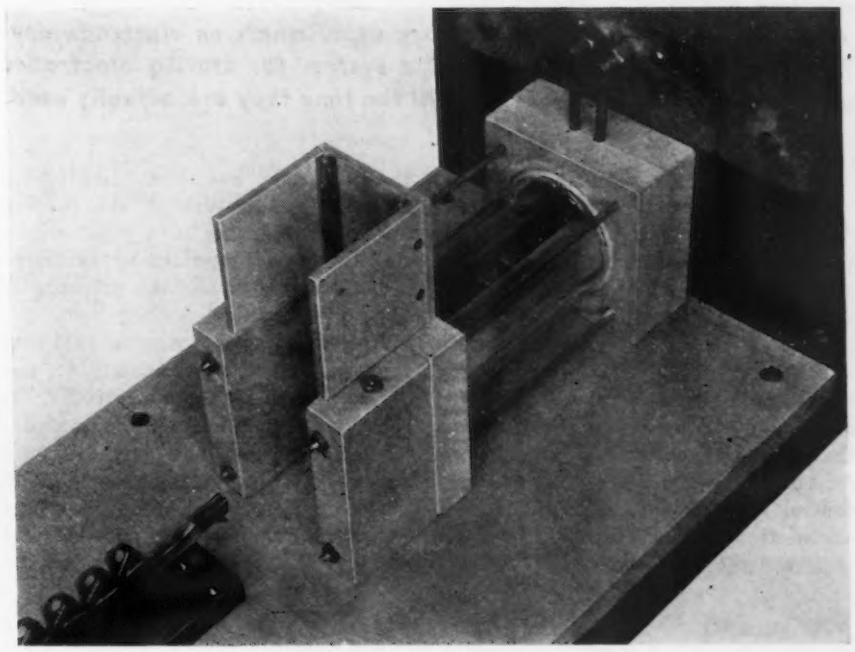
RIGHT

FIG. 2—A 3-in. transparent Vycor tube mounted in Transite asbestos flanges is used to form a hydrogen chamber for brazing six sights at a time in an Ecco high frequency induction unit. The structure supporting the work is also made of Transite. Work is pushed through the furnace to a cooling tube at the rear and thence to a water seal tank.



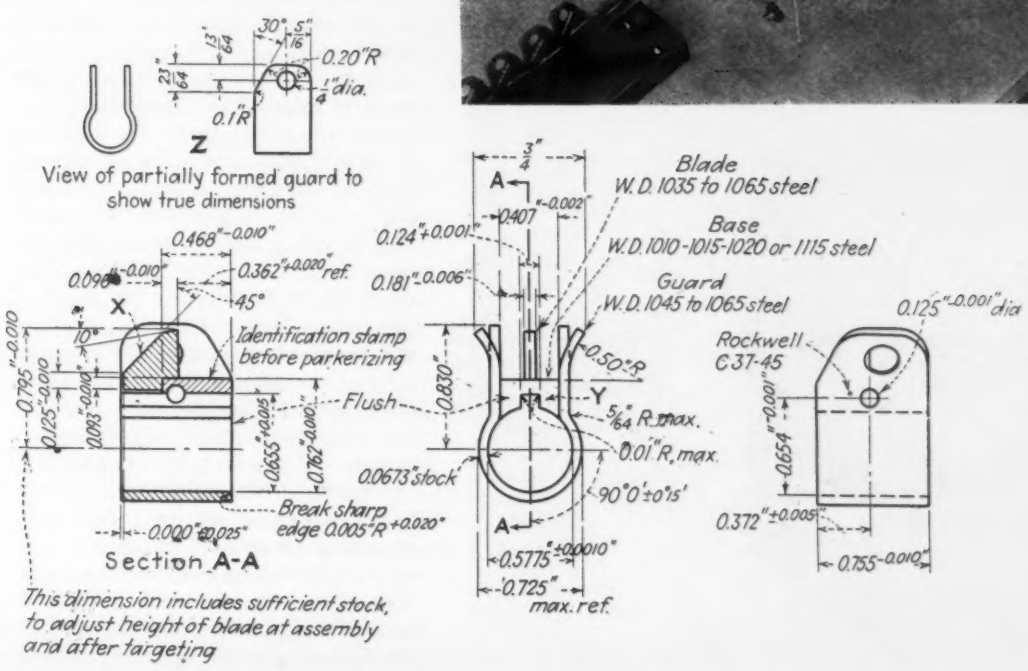


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FIG. 1—Three stampings are brazed together to form the carbine sight—the blade *X*, the saddle or base *Y* and the guard *Z*.

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Control of Moisture in Electrode Coatings

by R. V. ANDERSON
Formerly engineer in charge of the General Testing Laboratory, California Shipbuilding Corp., Wilmington, Cal.

. . . Absorption of moisture by electrodes seriously affects the quality of arc welds and is a real problem in shipyards where the relative humidity in coastal areas is seldom less than 70 per cent. After carrying out some laboratory experiments on electrode drying, this shipyard has developed a system for storing electrodes under controlled conditions up until the time they are actually used.

ALL electrodes used in shipyard welding should be approved by the American Bureau of Shipping for the work involved, but there are many things that can enter into the weldability results of the electrode that may not be contemplated by the approval. Through accident, the electrode manufacturer may leave out one of the ingredients that enters the electrode coating or he may be forced by circumstances beyond his control to substitute ingredients obtained from other sources. The electrode coating may be eccentric, and if the electrode has been improperly stored, the moisture in the coating may have built up to a point where the arc is characterized by excessive spatter and blow and the presence of pin holes in the deposited metal.

In round figures it may be said that electrodes cost approximately 6c. per lb. In converting these electrodes, especially in small diameters, into deposited weld metal the labor cost may be between 25c. and 30c. per lb. If the electrode results are poor, it becomes necessary to chip out the weld metal which means an expense of another 10c. to 20c. per lb. and to redeposit the metal costs an additional 25c. to 30c. It is, therefore, poor economy to use electrodes of doubtful quality which will produce poor results due to eccentricity or excess moisture.

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FIG. 1—G. E. electrode coating eccentricity gage reads directly in thousandths.

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As a protection to the production departments at California Shipbuilding Corp., a procedure has been set up for identifying all electrodes on arrival and for the complete testing of electrodes before they are released to the production departments. A rigid system of control of disbursement of electrodes from heated distribution cabinets has also been set up so as to prevent deterioration of electrodes before the welder receives them. The basis of the system of control is the assignment of a yard serial number to every carton of electrodes received by the general warehouse. This serves as a means of always disbursing the oldest stock on hand and identifying at a later date the particular shipment in case of welding difficulties.

For every shipment of 10,000 lb. or larger, one carton of each size and type of electrode is sent to the general testing laboratory for weldability test. This depends upon the type of electrode. For a 5/32 or 3/16 in. AWS E-6010 type, for example, test plates are welded flat, vertical and overhead to observe the arc characteristics and the depositing of the filler metal. Samples of electrodes are also taken diagonally through a carton and checked for concentricity of coating. This can be done by chipping the coating off the rod in spots spiralling around its length and measuring the coating thickness at a point diagonally opposite with a micrometer. An alternative method is to use the General Electric eccentricity gage

shown in Fig. 1. It records the thickness directly in thousandths as the electrode is rotated by the fingers while resting on V supports. This is a non-destructive test.

Eccentricity Specifications

In this connection it should be noted that according to AWS specifications A-205-37T coatings and coverings on electrodes of all sizes shall be concentric to the extent that the maximum dimension for the core plus one coating thickness shall not exceed the minimum by more than 3 per cent. Cross-sectional dimensions shall not vary from the nominal by more than plus or minus 3 per cent. Uniformity of coating and cross-section is important for uniform arc welding.

Sometimes differences in the coating of 0.003 to 0.004 in. produces extremely bad arc characteristics and "fingernailing" so that the electrode will not give satisfactory results on production work. The fingernailing is caused by the fact that on the side where the coating is thin, it burns off rapidly, while on the thicker side the tendency to burn off is reduced and the coating extends too far beyond the core wire. Fingernailing may also result from variations in density of concentric coatings caused by worn extrusion dies.

The laboratory also tests the same sample cartons for moisture content of coatings as received. This is the first step in the control of moisture up until the time of electrode use. Unless electrodes are properly stored and conditioned, a certain amount of moisture will be picked up. It has been found by tests conducted over a period of time, for instance, that the paper containers for electrodes, even though they may have an asphalt inner liner, do not protect the electrodes from moisture. Furthermore, if electrodes are removed from containers and left for any length of time in the open, the tendency to pick up moisture in the coating is accelerated, particularly if the humidity of the atmosphere is high, such as it is on the West Coast. Hygograph charts for a typical week last September, for example, show an average *low* humidity of 70 per cent and for a period of from 8 to 12 hr., at night and in the early morning, the humidity was above saturation.

Moisture Absorption Studied

Before the moisture control system was installed it had been the practice to remove the electrodes from the cardboard containers and tie them up into 5-lb. bundles for distribution. It was found that if these electrodes were left exposed to the atmosphere for 8 to 12 hr., the arc characteristics would become very poor due to the moisture pickup of the coatings. The accompanying table shows the results of moisture tests of electrodes in and out of containers. The results will obviously differ with electrodes made by different manufacturers.

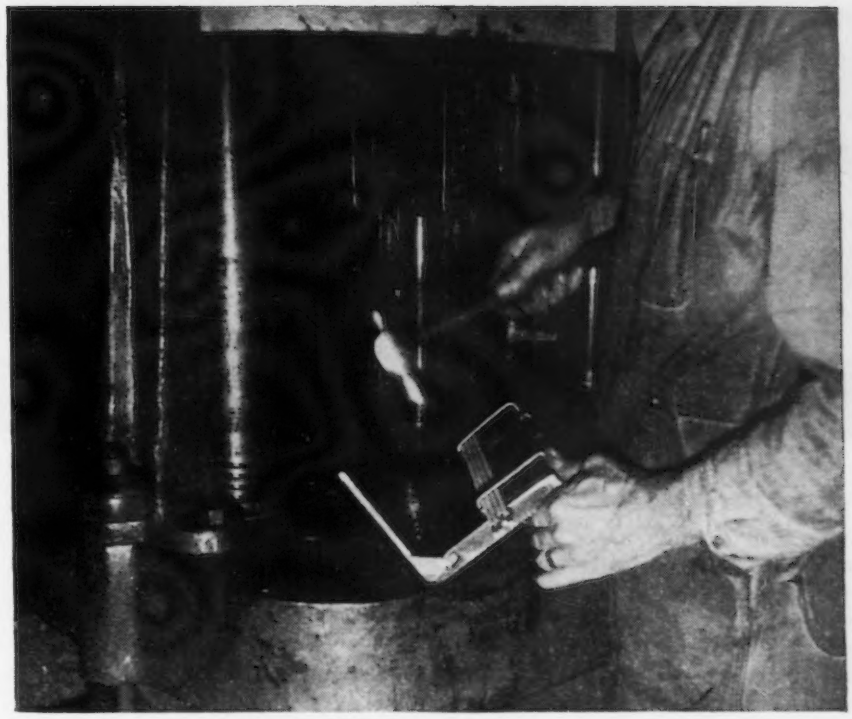


FIG. 2—Special jig arranged for holding a group of electrodes while the coatings are hammered off to obtain a sample for moisture determination.

Tests showed that the average moisture content of electrode coatings as received in this yard has been approximately 2 per cent and that most of the electrodes give best results at about this percentage of moisture. It was found, however, that as this moisture content approaches 4½ per cent arc characteristics are poor and as the moisture increases from 4½ to 7 per cent an increasing degree of poor weldability is encountered. This is a general statement and does not apply to all electrodes. Some types of electrodes on the market have a greater tolerance for moisture than others and some may give good re-

FIG. 3—Thermostatically controlled drying oven for removing moisture from 5-gm. coating samples.

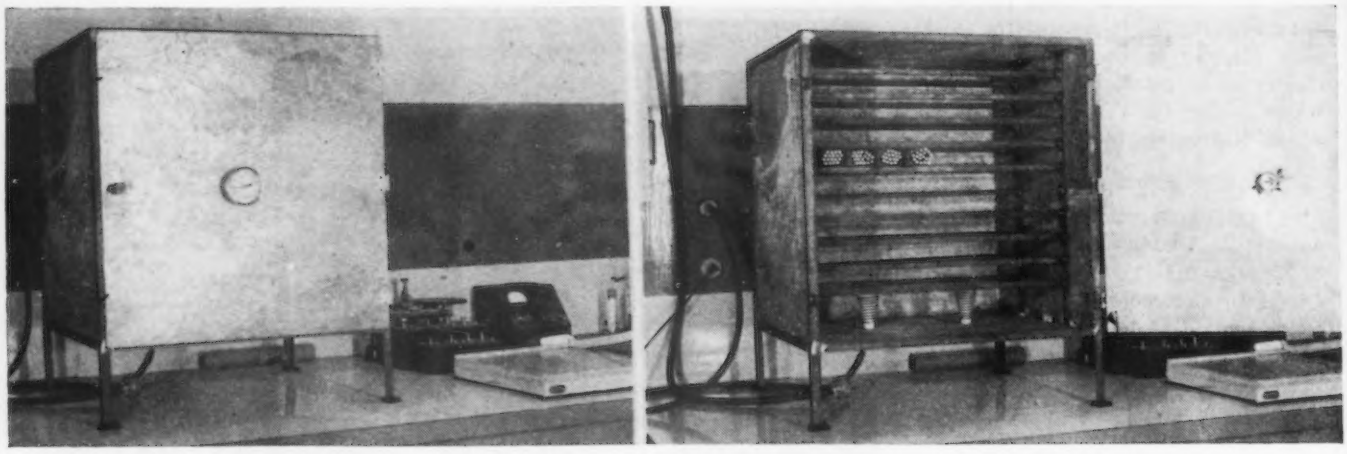


FIG. 4—Experimental drying cabinet built to study conditioning of bundles of electrodes.

sults with as high as 5½ per cent moisture. There are also some electrodes received from manufacturers with an average of ½ per cent moisture. These electrodes exhibit poor weldability results if the moisture content exceeds 3½ per cent.

Measuring Moisture Content

In making moisture tests on electrodes as received, the samples are selected diagonally through the box. The moisture may be determined in one of three ways:

1—By a solvent extraction process.

2—By weighing out a given amount of electrodes, drying them in an oven at 100 deg. C. for a period of 24 hr. to 4 days depending on size, reweighing, deducting the weight of the core wire and computing percentage of moisture in the coatings.

3—By removing the coating from the core wire, weighing out 5 gm. in a watch glass, removing the moisture in a drying oven for 24 hr. at 100 deg. C., reweighing and calculating the moisture content.

On larger diameter electrodes of the AWS E6020 or E6030 types there is some difficulty encountered in running moisture tests where the coating is left on the electrode, due to the problem of removing the moisture through the heavy coating thickness. The method of removing the coating from the electrode gives better average results with better checks and it is to be preferred.

At the Wilmington yard a jig, Fig. 2, has been devised to help in collecting samplings of electrode coatings. A machinist's hammer is used to break the coating from the core wire and as the coating is removed it slides down to the trough of the jig. The opposite plate is for the purpose of preventing the flying particles of the coating from being lost. After the coatings are removed from the rods, the sample is quartered and 5 gm. is carefully weighed out in a watch crystal.

After the 5-gm. sample has been weighed it is transferred to a drying oven, Fig. 3, thermostatically controlled to maintain a temperature of 100 deg. C. After drying 24 hr. the watch glass plus the coatings are placed in a laboratory dessicator for cooling. The coating sample is then reweighed and the difference calculated in per cent of moisture.

In making moisture tests it is essential that the work of taking electrodes from the container, removing the coating and weighing be done in the shortest possible time to eliminate as much as possible any gain or loss of moisture. A greater degree of accuracy than 1/10 per cent is not required; consequently any ordinary analytical balance may be used.

Drying Cabinets Designed

Because moisture pickup of electrode coatings is one of the most common causes of welding difficulties, the United States Maritime Commission has recommended that electrodes be stored in artificially dry rooms, either heated or air conditioned, or that they be dried out thoroughly immediately before use. In any event, slow and uniform drying should be used to prevent the coating from chipping.

In order to determine the best procedure for keeping electrodes dry, a small pilot drying oven, Fig. 4, was devised. This cabinet is made from 1 in. angle iron and 20-gage galvanized sheet iron. Heat is supplied by two cone type electric resistance elements of a type ordinarily used in electric heaters and a dial thermometer is placed on the door of the cabinet. For the purpose of circulating air, ¼ in. holes are drilled in the bottom and top of the cabinet.

As a result of this experimental work, large distribution cabinets were designed for use throughout the yard. The cabinets are capable of holding 3 to 4 tons of electrodes, so that ample drying time is allowed before electrodes are distributed for use. It has been found that the use of heated distribution cabinets has greatly improved the usability of electrodes and has eliminated much of the difficulty that has been encountered in the past.

Results of Tests on Moisture in Electrode Coatings In and Out of Containers

Electrode	Moisture as Received	MOISTURE AT THE END OF: 1 Day	2 Days	3 Days	4 Days	7 Days	14 Days	21 Days	28 Days
"A", E 6010 in container	1.12	1.12	1.12	1.12	1.16	1.65	3.05	5.06	6.50
"A", E 6010 removed from container	1.12	5.07	7.35	7.45	7.50	6.93	7.52	7.25	7.46
"B", E 6012 in container	0.96	0.96	0.96	0.98	1.08	2.05	3.21	4.18	5.23
"B", E 6012 removed from container	0.96	2.21	3.03	4.12	4.61	4.85	5.20	5.75	5.57
"C", E 6030 in container	0.45	0.45	0.46	0.48	0.45	1.35	2.40	3.65	4.83
"C", E 6030 removed from container	0.45	1.97	2.91	3.34	3.97	4.63	5.59	6.25	6.01
"D", E 6030 in container	0.46	0.46	0.46	0.50	0.58	1.21	2.03	3.21	4.40
"D", E 6030 removed from container	0.46	1.76	2.81	3.18	3.72	4.41	5.32	5.45	5.86

NOTE: All figures are in per cent. of contained moisture.

The complete system of control functions as follows: When a carload of electrodes is received at the general warehouse, the shipment is checked against the purchase order for specifications and quantity, and any visible signs of mistreatment or damage to cartons are reported to the claim department. For the purpose of control of stock issuance and future identification, each carton is boldly marked with an assigned serial yard number. In the warehouse, cartons are stored by size, type, manufacturer and yard serial number in such a manner as to have the oldest stock always available first, irrespective of the manufacturer. In fact, only the written authorization of the welding engineer can alter the consecutive order of withdrawals.

For each size and type of electrode a perpetual inventory card is maintained showing dates and amounts of receipts and withdrawals, amount on hand and date out, together with name of supplier, manufacturer's lot number, yard serial number, purchase order number and invoice number. From the cards a daily inventory report is prepared showing the amount on hand by size, type, manufacturer and lowest yard serial number.

From the general warehouse, electrodes are dispatched to a conditioning room and thence to heated distribution cabinets, both under the responsibility of the distribution department. In order for the distribution department to maintain stocks at established quantities, orders are placed daily with the general warehouse to cover the amount of electrodes by size and type as issued from the conditioning room on the previous days. In the conditioning room electrodes are stored by size, type and yard serial number and are cross-stacked to permit complete circulation of heated air. Temperature is maintained 24 hr. a day and it and the humidity are charted. Electrodes of oldest storage, as determined by the yard serial numbers, are issued to the electrode distribution cabinets. Here again a card file is maintained by size and type of electrode, showing date received, manufacturer, yard serial number, amount received, amount withdrawn, amount on hand and date out. From these cards a daily inventory report is prepared.

Electrodes are ordered out of the conditioning room by the distribution department in the order of the lowest yard serial number. All electrodes remain in their original cartons until placed in individual heated cabinets. No electrodes are bundled on counters or stacked in bins out of cartons at any time. Heat is used in electrode cabinets at all times. A record of issue and return is kept for each distribution station, showing the amount issued, size, type and yard serial number, amount returned and net consumption per shift. For each 24-hr. day, a consolidated report is made to show the net consumption by size and type for each welding division.

Thus disbursement of dry electrodes in quantities as needed by each shift is definitely assured. In general, it should be added that the laboratory can order the warehouse to withhold from production any lot of electrodes found unsatisfactory on test. The whole procedure is under the control of the welding engineer.

Electrode Changes Eliminated In Salt Bath Furnace

A NEW design in internally heated electric salt bath furnaces, which eliminates all necessity for changing the electrodes, and is said to improve operating efficiency and permit the hardening of very long tools, has been announced by the Upton Electric Furnace Division, Detroit.

Since about 90 per cent of the deterioration of electrodes is due to the presence of air in the heated portion of the electrode, the chief source of this trouble is entirely eliminated. The only portion of the electrodes exposed to the air in the new "Sealed-Electrode" furnaces is so completely cooled by circulating water that the exposed portions of electrodes are held at about body temperature. Thus, there is no oxidation of the exposed portion due to heat.

Cooling of the electrodes is by means of circulating water of normal temperature. The water circulates through the transformers and through the electrodes. About 1½ qt. per min. is the maximum amount of water required.

NEW design of internally heated electric salt bath furnace for pre-heat and high-heat treating operations eliminates the necessity for changing electrodes for the entire life of the pot.

The design of the new furnace is such as to permit it to be built to any reasonable depth without any increase in the area being required. As an illustration of this, the company has built a furnace 37 in. deep, with an area of only 9 x 9 in. This is not considered the depth limit. However, the deep furnaces can be operated with salt to any required depth. Thus a furnace initially purchased for operation at a depth of 48 in. could be operated at depths down to 4 in.

Of especial interest to the producers of small tools on a small production basis is the fact that the furnaces can be operated on merely enough salt to heat the tools, thereby saving considerable power. Since only about 5 in. of salt is required to hold the furnaces over, maintenance costs between actual heat treating operations are markedly reduced. The extreme, fast starting of the furnace is possible because of the small amount of salt required (about 3 in.) to hold the furnaces in operation.

. . . Heating Aluminum Billets

. . . Low frequency induction heating may be applied advantageously to metals of low resistivity since the depth of heat generation is large and temperature gradients in complex shapes are avoided. Experimental procedures and results are herein reported.

INDUCTION heating has been employed primarily for bronze and steel and has not, so far as the authors are aware, been used commercially at frequencies as low as 250 cycles per sec. The thickness p in which 86.5 per cent of eddy current power is generated due to an inducing current of frequency f is given by the formula.*

$$p = \frac{3570\sqrt{\rho}}{\sqrt{f\mu}}$$

where the ρ, the volume resistivity, is equal numerically to the electrical resistance of a 1 cm. cube and μ is the magnetic permeability. Obviously, for bronze or steel, with f equal to 250 cycles per sec., the thickness p is so large (about 1 ft.) that for samples generally encountered, the electromagnetic transfer of energy from the inducing coil to the sample is inefficient. But for a material of low resistivity like aluminum, with f equal to 250 cycles per sec., the depth, p, is about ½ in., the exact value of p depending upon the temperature since ρ increases with rise in temperature.

* *Standard Handbook for Electrical Engineers, McGraw-Hill Book Co., p. 1774 ff.*

For heating large cross-sections of aluminum with protruding webs or flanges, the significant decrease in inducing frequency from the conventional 9600 cycles per sec. to 250 cycles per sec. with the consequent increase in depth of heat generation, or eddy current penetration, has certain advantages. First, it is relatively simple to prevent undesirable thermal gradients between the edge of a web and the main body of the cross section of the billet. At the higher induction frequency, these gradients are caused by the large amount of heat generated within the thin web in relation to its mass. Second, the cost of equipment for producing 250 cycles may be 20 to 30 per cent of that for equipment commercially available for the production of 9600 cycle current with the same power capacity.

The lower frequency technique does, however, involve an inefficient use of electrical power since it is not economically practical to correct the power factor.

FIG. 1—Heating and cooling curves for Type A spar cap with heavy section billet shown in insert.

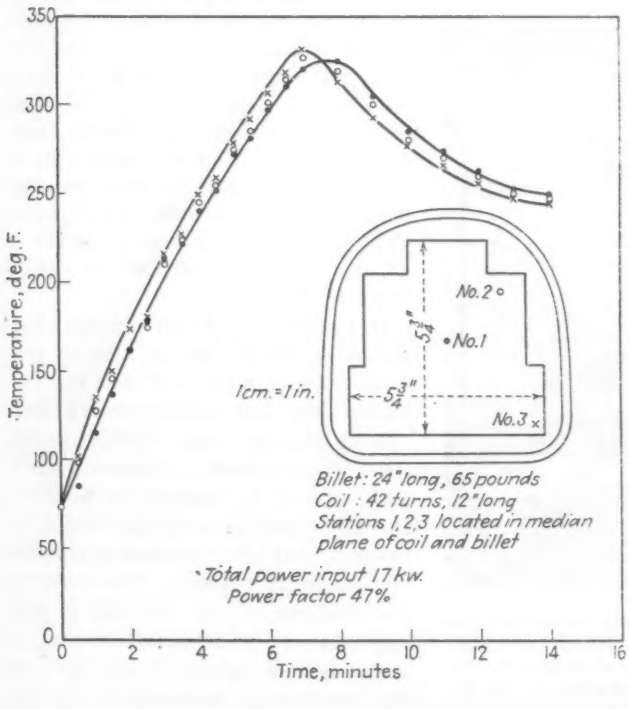
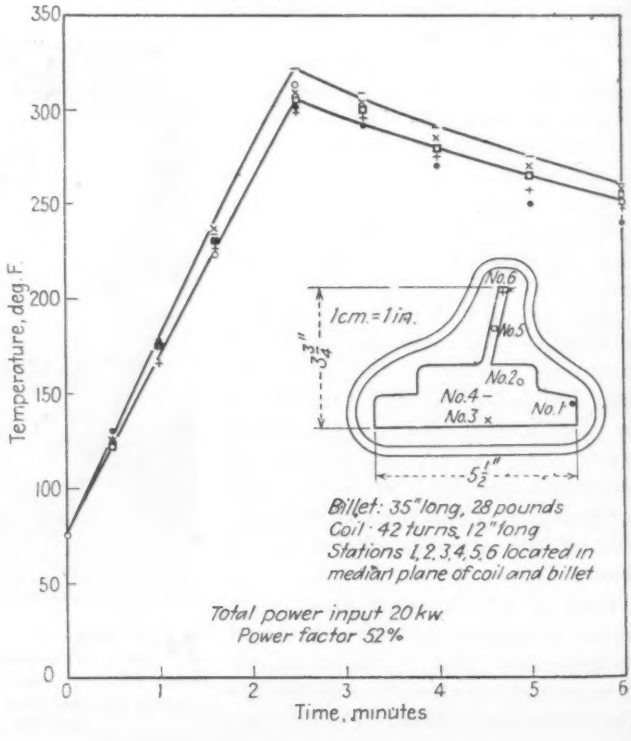


FIG. 2—Heating and cooling curve for Type B spar cap with light, flanged section shown in insert.



by Low Frequency Induction

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To test the possibility of using low commercial frequencies, a 100 kva. 250 cycle frequency converter was used to convert 440 a.c., 3 phase, 50 cycle to 300 volts, 3 phase, 250 cycle. One phase of the output of the converter was applied to a step-down transformer. The secondary output, almost 55 volts, 250 cycle, was applied directly to each of the induction coils. These coils were made of copper tubing; cooling water flowed through the coils at a rate of about ½ gal. a min.

Temperatures at various places within the spar caps were measured by conventional thermocouple technique. Three sample billets were selected as representative: Type A, heavy section, shown in Fig. 1; Type B, light section with a web, shown in Fig. 2, and Type C, heavy section, full length.

Before the tests were made, performance calculations were carried out with the coil-billet combination considered as a transformer. The input impedance of the transformer, the efficiency, amount of heat generated and the power factor were computed.

The following method of calculating performance values was used:

$$r_b = \frac{1.8 \times 10^{-6} \sqrt{f}\, bN^2}{h_b s}$$

where r_b = resistance ohms, primary resistance
f = inducing frequency in cycles per sec.
N = number of turns in coil
b = inner radius of equivalent circular coil in cm.
h_b = length of coil in cm.
s = space factor of coil winding. s is always less than 1.

The effective secondary resistance r_a in series with the primary impedance is given by:

$$r_a = \frac{2\pi\rho_a N^2}{h_a}\left(\frac{a}{p}\right)\left[F_r\right]$$

where r_a = resistance ohms
ρ_a = resistivity of the material being heated at the given temperature in ohm-cm.
a = equivalent radius of sample in cm.
p = depth below surface in which 86.5 per cent of flux concentrated is

$$\frac{(3.57)\ 10^3\sqrt{\rho}}{\sqrt{f\mu}}$$

h_a = length of section being heated in cm.
$\left[F_r\right]$ = magnetic permeability at the given temperature and is given in terms of related Bessel functions. It approximately equals 0.707 for large values of $\frac{a}{p}$.

The total resistance of the circuit

$$R = r_b + r_d$$

The total reactance of the circuit X, in ohms is given by:

$$X = r_a \frac{[F_x]}{[F_r]} \quad \frac{8\pi^2 N^2 f}{L10^9}\,(b^2 - a^2)$$

$[F_x]$ approaches 0.7 as $\frac{a}{p}$ becomes large.

The impedance Z of the coil is given by

$$Z_{coil} = R + jX.$$

To obtain the total impedance of the circuit Z_{total}, the impedance of the connecting cables must be added to Z_{coil}. The impedance of the cable can be calculated by the formula—

$$Z_{cable} = \rho\frac{\phi}{A} + J\omega L,$$

neglecting the capacitative reactance.

where $L = 0.00508\ (2.303 \log_{10} 41 - 0.75)\mu h$

ϕ = length of wire in in.
d = diameter of wire in in.
A = area of wire in same system of units as ϕ and ρ in the resistive portion of Z_{cable}.

$$Z_{total} = Z_{coil} + Z_{cable}$$

This does not, of course, include the impedance of the generator and transformer.

It was found possible to predict electrical-thermal characteristics with adequate accuracy. A comparison between predicted and measured

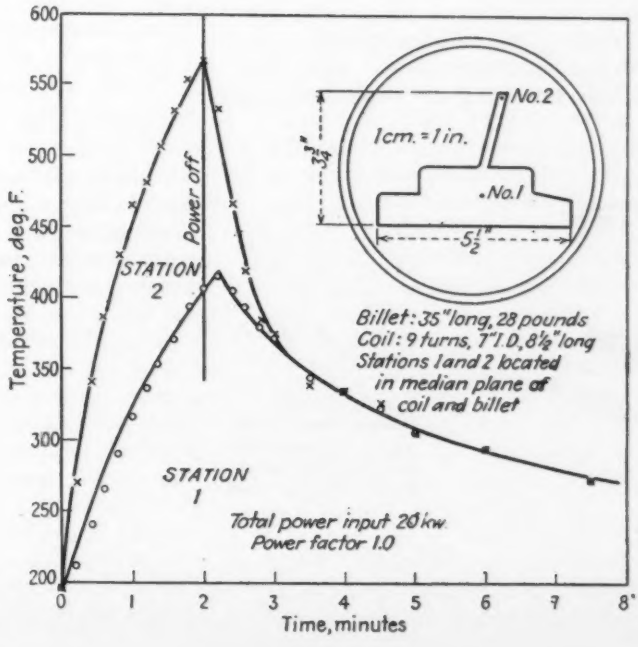

FIG. 3 — Heating and cooling curve for Type B spar cap obtained with 9600 cycle commercial machine.

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values for the type A spar cap follows:

Measured

Z = 0.045 ohms + j(0.088 ohms)
Power factor = 47 per cent
Efficiency = 54 per cent

Calculated

Z = 0.039 ohms + j(0.084)
Power factor = 42 per cent
Efficiency = 57 per cent

Heating and cooling curves appear in Fig. 1.

The disagreement between the two values of the electrical impedance, Z, is primarily due to the facts that (1) the leakage reactance and the resistance of the windings of the transformer were assumed for simplicity to be zero and (2) the rise in the resistance of the coil with temperature was neglected. The calculated efficiency was taken as the ratio of the resistance of the billet to eddy current flow to the total primary resistance, made up of the sum of the coil resistance and the secondary resistance. Measured efficiency was computed from the energy dissipated in heating the water flowing through the coil.

With a coil 12 in. long, a 6 in. long section of the billet had a uniform temperature within ± 10 deg. F. In order to heat a 12-in. section with the same temperature uniformity, a coil 24. in long would be adequate. Considerably less than double the power would be necessary.

For the light section with a web, Type B spar cap, preliminary calculations were qualitative only. Heating and cooling curves are shown in Fig. 2. As is to be anticipated, the web is somewhat cooler than the body of the billet because of the reduction in induction frequency. Differences in measured and calculated values follow:

Measured

Z = 0.032 ohm + j(0.054 ohm)
Power factor = 52 per cent
Efficiency = 50 per cent

Calculated

Z = 0.028 ohm + j(0.051 ohm)
Power factor = 48 per cent
Efficiency = 54 per cent

Results obtained with a 9600 cycle commercial machine are included for comparison in Fig. 3.

The Type C heavy section, an 8 ft. billet with a 3x5 in. section was heated to check longitudinal gradient characteristics and power requirements. Fifty kw. applied to a 24-in. coil would suffice to heat a section 12 in. long to 400 deg. F. ± 10 deg. F.

Conclusions

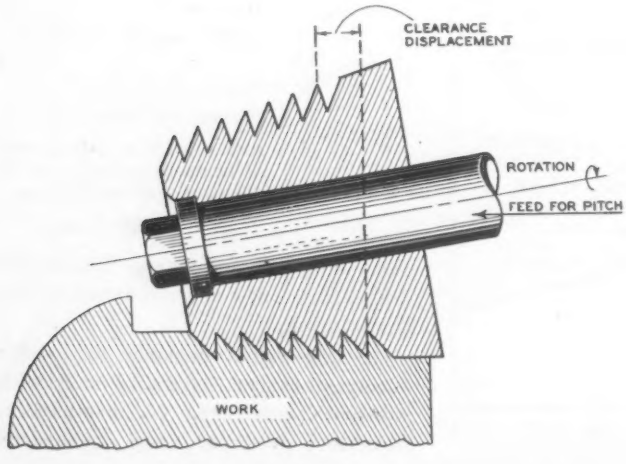
From these tests it was found that 250 cycles is a satisfactory frequency for induction heating of spar caps prior to bending. From a standpoint of depth of generation of heat, a low frequency like 250 cycles is superior to 9600 cycles for the induction heating of large masses of aluminum such as spar cap billets. The electrical and thermal characteristics of the combination of an induction coil and aluminum billet can be computed with better than qualitative accuracy.

Taper Type Cutter Mills Buttress Threads

PRODUCTION of straight side buttress threads at speeds heretofore thought impossible with thread milling has been achieved in a number of plants with the aid of a special taper type milling cutter developed by the Detroit Tap & Tool Co., 8432 Butler Avenue, Detroit 11. The specific application for which the cutter was first developed was to cut buttress or straight sided threads into an aluminum forging into which are screwed valve seat inserts. The advantage of this particular type of thread is that it provides maximum strength in one direction.

Originally, the threads in this part were National Standard form. To prevent breakage, however, it was considered more desirable to go to straight sided threads to provide additional thread strength. Grinding was not considered suitable for these threads. Conventional straight sided thread milling cutters were tried. These failed to give complete satisfaction, since they tended to produce a tearing action on the straight side of the tooth, especially at the point. Moreover, it was found to be impossible to incorporate provision for necessary clearance for the straight side of the form relieved cutter teeth. Tapping was also tried with high speed steel taps but this proved to be both slow and expensive as a method for producing straight sided threads. (The job has since been worked out with a special carbide tipped tap. —Ed.)

A field engineer from the Detroit Tap & Tool Co., after analyzing the problem, worked out the cutter and cutting action shown in the sketch. Cutter teeth engage the work parallel to the axis of the threads being formed but rotate about an axis inclined to the straight side of the thread. Inclination of the cutter at an angle equal to the taper of the cutter provides clearance for the straight side cutting face and results in even distribution of the cutting load over the full length of the tooth face without any tearing action. A plain milling section of the cutter removes the incomplete thread at the outer edge.



Section of 'Detroit' taper type thread milling cutter producing straight side thread. Note clearance displacement provided by inclination of cutter axis.

Powder Metallurgists Present Technical Advances

. . . First meeting of the Metal Powder Association considers a number of commercial problems involving standardization and technology. Papers were presented on iron, aluminum and copper powders, their production and use, and information was given on early developments and later patent litigation.

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ABOUT two years ago an effort was made to create an organization of companies interested in powder metallurgy, as a result of which the Powder Metal Institute was formed. It developed, however, that the preponderance of membership in that organization was not comprised of producers of metal powders, and the Metal Powder Institute later became a part of the National Automotive Parts Association.

Several months ago a group of metal powder producers felt that an Association should be formed, the membership of which would be confined to producers. As a result, on Jan. 26, 1944, a new Association was formed, the Metal Powder Association with 20 charter members. The first meeting of this Association was held on May 4 and 5, 1944, at the Waldorf-Astoria Hotel, New York. The first day was concerned primarily with a business meeting setting up certain functional aspects of the Association, creating standards and statistical committees, and listening to general reports on electrolytic iron powder, reduction of metal powders, electrolytic copper powder, and preliminary data developed by the granular powder standards committee. The second day of the meeting was devoted to presentation and discussion of a number of more formal technical papers of interest of both producers and consumers of metal powders.

In the business meeting, in a report on "Electrolytic Iron Powder," by B. T. du Pont, of Plastic Metals, Inc., it was pointed out that iron is usually deposited from cells whose electrolyte is one of two types, ferrous sulphate or ferrous chloride. The sulphate bath is usually credited with the ability to do a better refining job than the other. Chloride baths in general are operated at higher temperatures and at greater rates of deposition. These baths are largely operated with soluble anodes although insoluble anodes can be used, making additions to the electrolyte to maintain the iron content.

Pure iron anodes naturally yield a high purity product. Anodes of steel, cast iron, compacted sponge iron, or any source of iron compatible with the electrolyte may be used. Close chemical control of anodes and electrolyte must be maintained in order to insure a uniformly pure product. The temperature of the bath must be regulated as well.

Cell tanks for this purpose must be acid resisting, such as rubber, stoneware, plastics or similar materials. Cathode sheets of stainless steel are commonly employed. They are hung in the cell evenly spaced and interspersed with anode plates so that each cathode has an anode on each side of it.

Cells may be operated singly or in groups. The groups may be connected in parallel or in series "strings." Series connection permits taking advantage of higher voltage generating or rectifying equipment and reduction in size of the bus bars in use.

The deposited iron is "stripped" from the cathodes and milled to powder. A variety of mill types are satisfactory but in any case the milling should be done under controlled atmosphere conditions to prevent oxidation and fires. Screening of the product must be carefully controlled and checked. Close checking should be carried out with a Ro-tap or similar testing machine.

Annealing of the product is required to dispel work hardening, resulting from milling, and to eliminate any hydrogen remaining from the electrolysis of the iron. This treatment should be done in a non-oxidizing, non-carburizing atmosphere.

Electrolytic iron powder is very compressible, carburizes easily and uniformly and on account of the high purity is compatible with many addition agents or alloys. The green strength of compacts is high. Sintered parts made from electrolytic iron powder may be produced to a wide variety of specifications.

Among the outstanding properties which may be attained are:

(1) High Density
(2) Great strength and hardness
(3) Unusual ductility and toughness
(4) Excellent electrical characteristics

In a report on "Reduction of Metal Powders," by J. E. Drapeau, Jr., of Metals Refining Co., a problem was posed in that if a large bar of copper, or iron were available how could it be converted into a metal powder by the reduction method?

The first thing coming to mind is that copper is ductile so, therefore, it could probably be given some treatment to make it brittle. For example, oxidize the copper iron bar. The copper oxide or iron oxide could then be crushed up to the particle size and particle size distribution desired for a given metal powder. The copper oxide or iron oxide could then be placed in a suitable reducing chamber and with a fast diffusion of hydrogen or carbon monoxide gas at elevated temperatures start the reduction of these metal oxides back to their powder without melting.

One of these particles of oxide if examined under high magnification in the furnace while it is being reduced

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LEFT

BALL mill used for reducing iron particles to a powdered form.

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VARIOUS metal powders are blended in this equipment.

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would show that the hydrogen is attacking the surface of the metal oxide and removing the oxygen from the particle surface. In this reaction it may be noted that the removal of the oxygen has left a porous structure in the particle. For an example, in copper oxide it is found that at least 40 per cent porosity is obtained through removal of the oxygen from the particle by hydrogen or carbon monoxide.

There is an optimum temperature for the reduction of these metal oxides to avoid excessive sintering. The surprising thing in the reducing of metal oxides is the gases diffusing into and out of the particles. A company producing reduced metal powders has a number of problems relating to the method of milling, method of screening, method of removing extreme fines and coarse material, to produce day in and day out, a powder that will be uniform in specifications; such as apparent density, flow, screen analysis, chemical purity, green strength, compressibility, and sinter growth.

Talking on the subject of "Electrolytic Copper Powder," G. B. Smith, of U. S. Metals Refining Co., stated that electrolysis where copper is the metal involved brings to mind the three general types used with copper. They are (1) electrowinning, (2) electrorefining, and (3) electrodeposition.

In electrowinning, a source of soluble copper provides the metal for the electrolyte from which, by means of insoluble anodes, the copper is deposited on cathodes. This process eliminates the pyrometallurgical operation of producing an impure metallic anode for subsequent refining. The Chuquicamata plant of Chile Copper Co. is an example.

In electrorefining, the electrolyte acts as a transfer medium through which the current carries the copper ions from the impure anode to the high purity cathode. Anode impurities such as Au, Ag, Se, Te, and Pb settle to the bottom of the tank as slimes while others such as Ni, Fe, As, Sb, and Al go into solution in the electrolyte and are not deposited upon the cathode. All of the large copper refineries use this process.

In Electrodeposition, the object used as cathode is plated or covered with copper in order to give it new characteristics. The electroplating and electroforming industries are examples of this type.

The electroplater is interested in a fine grained, strongly adherent, bright deposit. The electrorefiner wants a pure deposit which is adherent but can be large grained. The electrolytic powder producer needs a poorly adherent, controlled grain size deposit.

Electrolytic copper powder falls mainly in the electrodeposition type. Long before the commercial need for copper powder was realized, electrochemists found that there resulted in each of the above processes, at times when conditions varied from the approved standards, a product similar in many respects to the electrolytic copper powder of today. The electrowinner could not completely remove all copper from solution without getting a spongy non-adherent deposit which was a nuisance to him. The electrorefiner often had trouble when circulation stopped and there was a depletion of copper in the electrolyte near the surface. The cathode surface extending into this area would become covered with a non-adherent deposit. The electroplater had to stay within definite bounds of current density and copper content of electrolyte or he would cover his object with a spongy deposit instead of a dense smooth copper plate. Therefore, when a need for copper powder became apparent, the electrochemist quickly remembered the "freaks" of established processes. He learned to control conditions so that he could always get a spongy deposit instead of only on certain occasions.

Experience taught him that control of temperature, current density, circulation, conductivity, impurities, time between removal of deposit, type of electrodes, and addition of suitable nuclei would make it possible for him to control the size, shape and other characteristics of the particles. Thus

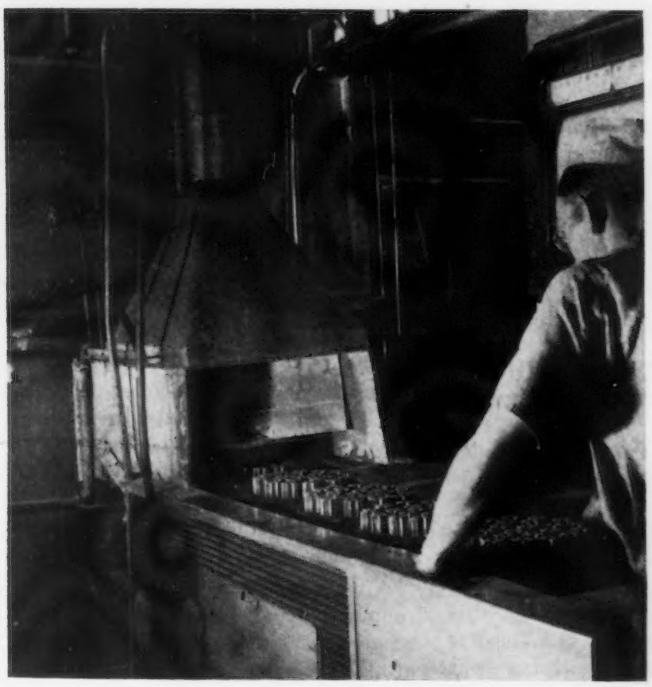
developed the electrolytic copper powder of today suitable for washing, drying and sizing to give products meeting the specifications needed for fabricating into bushings, bearings, clutch facings, brush filters, brake bands, etc.

As stated before, electrolytic copper powder falls chiefly in the electrodeposition group since the anode material consists of already commercialized copper (generally of electrolytic grade) and a deposit of definite characteristics is formed on a suitable cathode. There is in the process a further refining of the copper from that group of impurities which go into solution and are not codeposited with the copper. Some impurities are, therefore, lower than those of anode material while others are equal. Then in the final product there are some impurities higher than in anode material because of mechanical addition through further processing. The oxygen content of copper powder is high compared with other copper products because of the tremendous increase of surface area per unit of weight. The comparison of surface area per unit of weight of a particle 44 μ in diameter (the largest which will pass through a 325 mesh screen) and a sphere 1 cm. in diameter is in the order of 225 times. Many grades of powder contain a majority of particles lower than 10 μ in diameter where the surface area per unit of weight as compared with a 44 μ diameter particle is another four times as much. This oxygen content in electrolytic copper powder manifests itself as a thin surface film of CuO in which the particles are sometimes almost black even with less than 0.50 per cent oxygen. Occasionally the film will be either Cu_2O or a mixture of CuO and Cu_2O and, on very rare occasions, a few particles can be found with a surface of exceeding beauty as a result of copper suboxide (Cu_4O).

Nearly all of the electrolytic copper powder is produced in an acid sulphate electroylte. As compared with electrorefining, the copper content of the electrolyte is much lower and electrode current density higher. The cathodes in some cases are revolving disks from which the spongy deposit is automatically scraped. In others, stationary cathodes are brushed off manually at regular intervals. The copper mud which accumulates in the bottom of the cells is then washed free of acid and water soluble salts after which it is ready for drying, usually under reducing conditions. A grinding to break up the agglomerates is followed by screening, testing, and blending to definite specifications.

Concluding the day's business session, J. F. Sachse, of Metals Disintegrating Co., and chairman of the Standards Committee, presented his report. He pointed out that the committee realized that there are many tests, both for chemical and physical properties, that are applicable to metal in powder form. It was not their intention to establish an entirely new series of such tests for metal powders regardless of the applicability of those already in common usage. That would result in a duplication of effort which is inadvisable at any time, and today is inexcusable. There are many methods of analysis recommended, such as by the American Society of Testing Materials, which are as applicable to metal in powder form as they are to massive metal. It is not the intention of the committee to affirm these methods where there is any question that they are applicable.

There are other methods of analysis, however, where the applicability to metal powders cannot be taken for granted as readily. There are still other properties of metal powders, satisfactory test methods for which have never been published. In this category are found many of the tests for functional as opposed to absolute qualities. One of the most contentious and loose methods in use today is the so-called "hydrogen loss analysis," which does not report the oxygen content of a powder in the absolute but, more precisely stated, reports the per cent loss in weight that can be ex-



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COMPRESSED gears of iron powder are entering a sintering furnace on a continuous belt.

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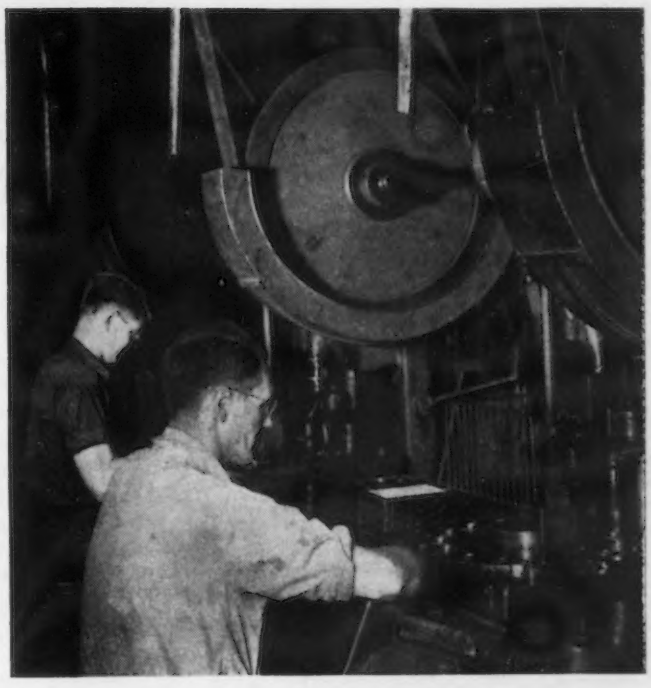

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AFTER sintering, the articles are coined to final dimensions.

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pected upon heating a metal powder compact in a strong reducing agent, that is H_2, at a probable sintering temperature, for longer than a commercial sintering time cycle. This test is made currently under a variety of conditions and one of the tasks the committee has set itself to do is to standardize these conditions. One of the first things to do is to have the laboratories of the companies who are members of the Association interested in this particular test, run hydrogen loss determinations, to determine the practicable temperature and time upon which the industry should standardize.

The plan is to err on the side of apparent inaction, in the sense that it is believed that any existing standard should be very exhaustively examined before we recommend that it be changed. There is no desire to burden the members with standards that are of doubtful value or doubtful necessity. A general goal has been set: That a standard or specification in order to be acceptable to the committee and to be worthy in its opinion of promulgation should satisfy certain requirements. It is believed that too many standards or specifications are a little worse than none at all, and the committee wants to be sure that what it proposes as a new standard or specification will:

(1). Be in response to a real requirement for a standard not furnished by existing accepted specifications.

(2). Be commercial in the sense that care in manufacture, commensurate with the sales price of the article, will result in the production of a suitable high percentage of the commodity acceptable under the specification.

(3). Tend toward the interchangeability of grade numbers as between several manufacturers so that the prospective users of metal powders will not be confronted with a large array of grades in each manufacturer's catalog, the subtle differences between which are mystifying to the novice.

Likely little argument will be raised by the first two qualifications. Regarding the third, however, Mr. Sachse mentioned that he would like to state his position more fully. These subtle differences of grade are possibly important to established users and these established users can be sure that their suppliers will continue to supply them the material around which their techniques have been built. However, if standardization takes the course in this industry that it has taken in others, the natural trend will be toward reduction in cost as the number of grades is reduced. Due to regulations which prohibit passing on increased cost of manufacture in the sales price of an article, it is exceedingly important to producers to see where costs can be reduced without increasing the sales price. It may well be, then, that even the special grades, dear to the heart of specific users, may lose some of their attractiveness when viewed from a cost standpoint.

The metal powder field is divided into two rather distinct sections, which has followed in the establishment of two standards committees, the one for "flake powders" and the other for "granular powders." The definitions are at present qualitative, but said to be:

(1). A flake powder is one, two of whose dimensions are many times its third dimension; for example, a sheet of paper.

(2). A granular powder is one whose dimensions of length, breadth, and thickness are of the same order of magnitude; for example, an orange or a lump of coke.

The committee has not yet reached the point of saying that if the thickness of a particle is more than one-tenth its length or breadth it ceases to be a flake and becomes a granule, but it is realized that there are types of powder which fall between the two extremes defined, which are borderline cases. What shall be done about them will depend on the particular conditions. The most apparent borderline case is magnesium powder. This powder has definite flake-like characteristics but does not flow as much as the bronzing powder or metallic paint pigments with which the flake powder committee is concerned. For this reason it was decided that the members of the Association who manufacture magnesium powder should have this situation presented to them.

The general conclusion which can be drawn from the replies to this questionnaire is that the magnesium powder producers feel that their production is so tied in with government specifications that there is very little that could be done by them in the way of altering the government's idea of what is wanted.

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Technical Reports to the Metal Powder Association

By F. H. CLARK
Metallurgist, Western Union Telegraph Co.

BOTH producers and consumers of metal powders had a chance to air their grievances in a day of healthy discussion at the second day meeting of the Metal Powder Association. There was give and take on both sides and an airing of mutual problems which was instructive to all those who attended. It is to be hoped that many more such events will occur so that knowledge of the fundamental problems encountered in powder metallurgy will be increased to the benefit of all.

The first paper, "Powder Metallurgy Merry-Go-Round," by S. K. Wellman and John Wulff, was presented by John Wulff of M.I.T. The industry of powder metallurgy was likened to a three-ring merry-go-round in which the center group represented those working in the patent field; the next outer ring represented the courts which are making decisions in patent litigation; and the outermost ring represented producers and consumers of metal powders. All three circles are whirling merrily around without much regard for each other with the result that the picture is a confusing one.

It was the speaker's earnest desire that credit for the early developments in powder metallurgy be assigned to E. C. Gilson of the General Electric Co. who obtained a patent on porous bearings by mixing, pressing and sintering a combination of copper oxide, tin oxide, graphite and lead. A perusal of this patent will be instructive to students as both the chemical and mechanical engineering involved is impressive. The process is interesting as the exothermic reaction of copper oxide with carbon aids in reducing the tin oxide and in melting the lead which gradually fills the pores.

Approaching the next merry-go-round, the courts, the speaker reported on an extensive survey undertaken of decisions by the courts in patent litigation. The trend since 1936, following a decision by Douglas in the Supreme Court, has been in favor of the defensive side. It appears, therefore, that the value of patents is very great for defense and less important for offense.

Coming to the third merry-go-round, the producers and the consumers of metal powders, the speaker pointed out the special role of powder metallurgy in manufacturing a product not producible by other means, such as the hard carbides, porous bearings, and friction materials. In this field, the price of the metal powder is not so important since quality

(CONTINUED ON PAGE 135)

For other articles on the metallurgy of metal powders, see THE IRON AGE, *issues of Feb.* 25 *and June* 3, 1943; *Jan.* 6, 1944; *and the forthcoming issues of June* 15, 22 *and* 29.

LOUIS R. BOTSAI

Newly elected president of the American Gear Manufacturers Association

Gear Manufacturers Approve New Standards

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EXCELLENT attendance at the technical committee meetings, wherein the real work on standardization is accomplished, featured the 28th annual meeting of the American Gear Manufacturers Association, held at Rye, N. Y., May 22 to 24. Like most engineering society and trade association conventions this year, general attendance broke all previous records. Most interest in standard practices in the course of development centered around inspection of gears, including measurement over pins and tolerances on master gears; also on the standardization of splines.

S. L. Crawshaw, plant manager, Western Gear Works, and chairman of the general engineering committee of the AGMA, was able to report that a new standard on spur gears was in the process of being edited, a preliminary outline for practice in the manufacture of bronze gears had been prepared and that the standard on durability and strength of cast iron gears was being revised to conform to the wishes of the American Petroleum Institute. At the final session, an AGMA Standard Practice on bevel gear speed reducers and combination speed reducers was approved as was a new AGMA standard system for fine pitch straight bevel gears. The former largely ties in with previously issued standard practices used in the design of the various elements entering the speed reducer and includes charts for determining the thermal horsepower capacity of the units.

New Officers Elected

Louis R. Botsai, manager of the gearing division, Nuttall Works, Westinghouse Electric & Mfg. Co., Pittsburgh, was elected president of the association to succeed Russell C. Ball, president, Philadelphia Gear Works. Mr. Botsai has been active in AGMA affairs for a number of years, having served the association as treasurer for four years and for the past year as vice-president. His entire business career has been with Westinghouse which he became affiliated with upon graduation from Auburn. He served in the company's engineering and sales departments prior to his appointment as manager of the gearing division.

Succeeding Mr. Botsai as vice-president of the association is Paul W. Christensen, president and general manager of the Cincinnati Gear Co. Mr. Christensen has just completed a term as treasurer of the AGMA and has been a member of the association's board for a number of years. His business career has been entirely with the Cincinnati Gear Co., which was organized by his father. Besides this, he is vice-president of United Aircraft Products, Inc., Dayton, Ohio, and American Precision Products, Inc., Belleville, N. J. He is chairman of the Cincinnati Steel Treating Co. and a director of the Doyle Machine & Tool Co., Syracuse, N. Y.

Raymond B. Tripp, vice-president of the Ohio Forge & Machine Co., Cleveland, was elected treasurer to succeed Mr. Christensen.

At the annual meeting, four new names were added to the executive committee of the AGMA: Walter L. Schneider, vice-president, Falk Corp., Milwaukee; John W. Hertzler, manager of the worm gear division, De Laval Steam Turbine Co., Trenton; Charles R. Staub, chief engineer of Michigan Tool Co., Detroit, and Allan H. Candee, mechanical engineer of Gleason Works, Rochester, N. Y.

Walter P. Schmitter, chief engineer of the Falk Corp. and past president of the AGMA, was presented with the Edward P. Connell Award, a medal established by the Falk Corp. as a memorial to its late vice-president. The award was made to Mr. Schmitter in recognition of his contribution to the gear industry and to the association. Besides serving as president of the AGMA, Mr. Schmitter has been continually active in the preparation of the association's technical standards and is an active member of many of its committees, as well as a member of the executive committee.

Statistical Method Favored

Citing as an example the building up of catalog ratings of ball bearings based on experience and the use of simple mortality data, John O. Almen, research division, General Motors Corp., spoke in favor of the statistical approach in aircraft gear design, based on empirical data, rather than on mathematical formulas. He showed by charts that it was almost impossible to predict the fatigue life of spiral bevel pinions from the calculated stress using the Lewis formula. Modifying this formula by the McMillen-Durkan method, however, leads to a high degree of pre-

dictability based on statistical analyses he presented.

Speaking of aircraft spur gears, Mr. Almen indicated that most of them are overdesigned from the strength viewpoint. Gears of too coarse a pitch are typical of this type of unbalanced design. He advocated a "one-horse-shay" design in which a gear would fail simultaneously in three ways: tooth breakage, tooth pitting and tooth welding or scuffing. At present the last two types of failure are most common in aircraft gearing. In analyzing scoring failures, the speaker called attention to three basic factors—unit contact pressures, base temperature and amount of sliding that takes place at various points on the tooth flank along the line of action.

Contact Pressure Analyzed

Using the Hertz formula for contact pressure between two cylinders, unit pressures in the range of 200-300,000 lb. per sq. in. are obtained. At low speeds, the load may be so high as to actually cause cold flow of metal even in materials heat treated to a hardness of 62 Rockwell C. At high speeds, the instantaneous heat generated in small contact areas is extremely high and the high pressure and high velocity favors scuffing. Likewise high temperatures in the gear box increases susceptibility to scoring. In this connection, Mr. Almen indicated that use of E. P. lubricants containing anti-welding fluxes like sulphur and lead raise the allowable pressure intensity.

These compressive stresses are by no means uniform over the face of the tooth since the ratio of the equivalent contact cylinders varies widely from tip to root of the driven tooth. At the start of contact, because of the nature of the involute curve, the contact condition is comparable to a small cylinder in contact with a much larger one, whereas nearer the end of the line of action the equivalent diameters are more nearly of a size. The compressive stress factor varies accordingly, Almen indicated. Similarly, the sliding velocity varies over the line of action, being zero at the pitch line and maximum at tip and root.

Proposing the use of a scoring factor in design, made up of the unit pressure (Hertz formula) times the instantaneous sliding velocity (ft. per sec.) and the temperature (as related to the area of tooth contact), Almen indicated that gears could be designed to favor a lower scoring factor. Using a long addendum pinion in contact with a short addendum gear, for example, has the effect of reducing the scoring factor since it tends to give lower unit pressures and correspondingly lower temperatures, while at the same time reducing sliding at the extremities of the line of action. The speaker pointed out that use of severe tip relief, through a bastard design, accomplished the same effect because it brought the extremes of the teeth out of sliding action. He dismissed increment or impact loading as being of any importance in light aircraft gears and favored use of only one pair of teeth in contact.

Plotting data on 39 gear designs supplied by a number of aircraft engine manufacturers, Almen showed wide scatter and lack of correlation between success or failure of such gears and their PV values (unit pressure times sliding velocity). Good correlation was obtained, however, when the PVT scoring factors (T=temperature as related to area of contact) were plotted. He found no correlation on these same gears between calculated bending stresses and tooth breakage nor between unit pressures and pitting experience.

Almen emphasized the fact that grinding of gear teeth is detrimental because it reduces the surface hardness by removal of part of the carburized skin and that the residual stresses due to grinding may be very high, particularly just at the surface. He suggested lapping of hardened gears or use of better grinding technique. On the other hand, a compressively stressed carburized case definitely prevents propagation of grinding cracks, which for this reason are not necessarily fatal. Grinding should be restricted to the flanks of the teeth and the roots should be shot blasted or peened to pre-compress the material and reduce fatigue failures at this point of stress concentration.

In conclusion, Almen pointed out that lubricants are not used properly in most gear sets. Lubricants, he said, serve best as coolants and hence fuel oil is actually better than a viscous grease, even on heavily loaded gears. Because the cooling function predominates, jets of lubricant should be directed against the teeth as they come out of mesh rather than when they enter since the teeth are hotter after contact. Besides, this scheme obviates heating of oil due to its being squeezed out of the teeth when directed on the entering side of contact.

Reviewing formulas for calculating gear tooth strength since Wilfred Lewis introduced his well known formula in 1892, M. Maletz, analytical mechanical engineer, Kearney &

PAUL W. CHRISTENSEN
Vice-President of the AGMA

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Trecker Corp., proposed the application of the maximum distortion energy theory for the calculation of combined static stresses in spur gear teeth. His method takes into account both the shear stress and the bending stress rather than a maximum compressive stress. It also includes a method of computing the point at which maximum stress concentration occurs which is somewhere in the fillet. Equations for the fillet curve have been derived as well as equations for determining the point of tangency (with the fillet arc) of a parabola whose origin is the intersection of the horizontal component of the tangential tooth load with the axis of the tooth.

Bearing Problems

Sleeve bearings are to be preferred over ball or roller bearings in high speed gear drives, according to Henry W. Kayser, development engineer, Falk Corp., who presented a paper on the subject of bearings for gear drives. In laboratory tests at Falk, sleeve bearings have been successfully operated at journal speeds of 21,000 ft. per min. and loads of 750 lb. per sq. in. In fact, he indicated that the higher the speed, the better the results.

Most of Mr. Kayser's paper was devoted to the development of formulas for calculating bearing loads in gear drives. In connection with the selection of anti-friction bearings, the speaker called attention to the difficulty of selecting bearings to suit the calculated load conditions, due to the

WALTER P. SCHMITTER
Recipient of the Edward P. Connel Award

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differences in method of rating used by the various bearing manufacturers. Graphically, he compared the ratings of four makes of deep groove ball bearings to show the close agreement between some and wide variations between others, particularly in the larger bearing sizes. In the discussion, other speakers called attention to the fact that catalog ratings are based on average bearing lives ranging all the way from 3800 to 25,000 hr. It was the consensus of opinion at the meeting that the ball and roller bearing manufacturers should attempt to achieve some degree of standardization of ratings for bearings of the same type and size. Minutes of this part of the discussion are to be sent to the anti-friction bearing manufacturers to stimulate action on their part.

Postwar Labor Conditions

Increased labor efficiency has not been a factor in increasing output during the war effort and hence it may be expected that in the postwar era the output of workers will be no greater than in the prewar period, according to Frank D. Newbury, vice-president of Westinghouse Electric & Mfg. Co., who spoke on some postwar problems after first reviewing what has happened in converting from peace to war. He pointed out that although the dollar value of annual production by Westinghouse has increased 308 per cent in comparing 1943 with 1939, with an increase of only 145 per cent in the number of employees and 44 per cent in floor space, nevertheless, the same ratio of manufacturing cost to billing value prevailed in 1943 as in 1939.

Mr. Newbury concluded that all the economies of high production, including longer runs and less variety of product, had been cancelled out by increased labor costs. For one thing the company has had to contend with a lower average skill and has had to spend large sums for training purposes. Five major divisions, for example spent over $9,000,000 for training new employees, at an average cost of $557 per employee gained. At one Westinghouse managed Navy plant, $25,000 is being spent currently for foremen training alone, since the most severe problem at present is upgrading workers to supervisory jobs.

Except in the case of a severe depression, the speaker saw no possibility of a reduction in hourly wage rates since there will be considerable pressure from organized labor to maintain them in the face of shorter hours. High wages are not to be feared, if wages represent a fair share of production costs. That they do not do so now, Mr. Newbury indicated by an example. In 1939, Westinghouse made a profit of $2 million on billings of $19 million, whereas under today's ceiling prices, increased labor costs would absorb the entire profit, assuming these same goods could be produced.

To continue the upward trend in wages, Mr. Newbury called for more cooperation from labor and castigated what he termed the mistaken policy of some unions toward so-called speed-up systems. Restraint of production should become as reprehensible as restraint of trade, he said. Furthermore he contended that any properly administered wage incentive plan is better than "straight time," since with day work, the slowest worker sets the pace.

The No. 1 postwar problem was seen as that of restoring low manufacturing costs. Better engineering, better equipment and better methods will be needed to offset the scars of wartime extravagance and to make profits possible under price ceilings. On the other hand, Mr. Newbury saw a higher price level inevitable and maintained that higher prices go hand in hand with high business activity. He admitted, however, that much depends upon the confidence of the public. Capital and consumer expenditures are required in large volume to maintain prosperity. There will be a huge reservoir of savings available after the war and unless the spending of this money is sterilized by lack of confidence, prices are bound to rise. Price controls will merely slow down the trend, the speaker said and he predicted that prices may increase as much as 33 to 50 per cent over the 1940 level.

In the immediate postwar years, Westinghouse looks forward to much greater activity than in 1940 (175 per cent higher) although this will represent a dollar output of only 60 per cent of 1944 predicted billings. Plants making appliances are expected to employ many more people than in 1941, but a Westinghouse division making heavy industrial machinery and now employing 14,000 workers is not expected to employ more than 3-5000 in the postwar period.

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THREE-DIMENSIONAL models for photoelastic stress studies are made from a new plastic, which resulted from a search for an insulation material by Westinghouse engineers. Heretofore, suitable plastic for these models could be obtained only in small pieces—sheets measured less than 100 sq.in. and were only ¾ in. thick. Several months to a year were required to cure the old material satisfactorily. According to Westinghouse, the new plastic has no such limits. Already produced in the laboratory in sheets measuring 600 sq.in., it can be cured in two days. Larger and thicker pieces of the photoelastic product will permit stress analysis by polarized light of large full-scale models, such as the crane hook pictured.

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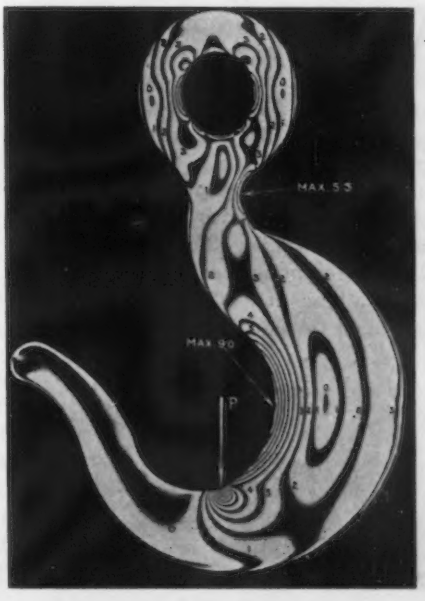


New Equipment . . .

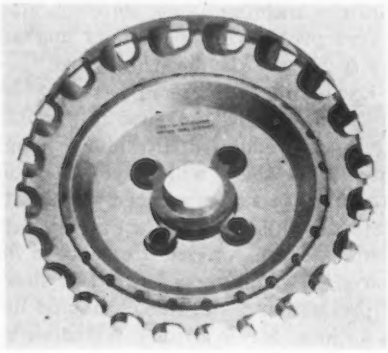
Small Tools and Cutters

New developments in cutters, tool holders, grinding wheels and grinding wheel dressers are contained in this week's review.

A LINE of inserted-blade cutters, known as Kennamills, for step-milling of steel has been introduced by *Kennametal, Inc.*, Latrobe, Pa. They are available in four sizes: 2 in. with three blades and 3, 4 and 5 in., each with four blades. The 2 and 3 in. sizes have taper shanks to fit Nos. 40 and 50 spindles; the 4 and 5 in. sizes have taper shanks to fit No. 50 spindle only. All sizes use the same standard replaceable Kennametal-tipped blades. Two sets of blades are supplied with each cutter head.

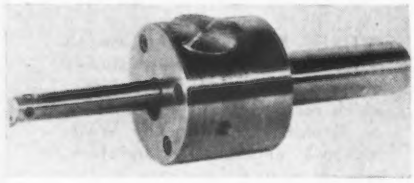
Carbide Tipped Tools

A LINE of standard carbide tipped cutting tools in six shank and tip styles has been put on the market by the *New England Carbide Tool Co., Inc.*, 60 Brookline Street, Cambridge 39, Mass. All tips are finish ground on diamond wheels. The tools are supplied with either of two grades of carbide. The "U" grade will cut aluminum, cast iron, bronze, non-metallics, etc. The "S" grade is supplied for cutting steel.



Milling Cutter

A HEAVY duty face milling cutter has been put on the market by the *Lovejoy Tool Co., Inc.*, Springfield, Vt. The blades are 1 in. in diameter, capable of taking cuts up to ¾ in. The Lovejoy locking principle is employed and the blades are interchangeable through the complete range of the Type H sizes. The mill is furnished in diameters 6 to 8 in. inclusive for shell-end arbor mounting and diameters 9 in. and larger for spindle mounting. They can be furnished with negative cutting angles.

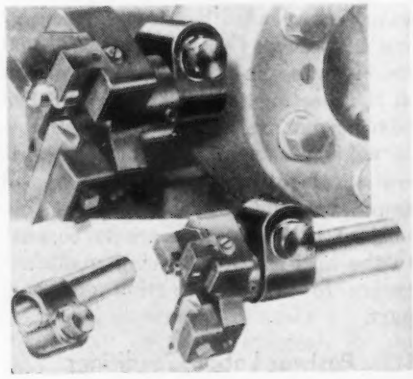


Adjustable Boring Head

A DIAL-SET adjustable boring head which can be used in both screw and milling machines is announced by *L. H. Harvey Associates*, 254 First Avenue North, Minneapolis. It is adjustable by means of a large, easy-to-read 1¼ in. dial calibrated in 25 divisions of 0.001 in. The Borset is available in two sizes: No. 1 for bores from ½ to 1¾ in., and No. 2 for bores from ½ to 2¾ in. Both have 1 in. standard shanks but may be obtained with Brown & Sharpe No. 9 taper or No. 3 Morse taper if desired. Two borings bars for straight and bottom boring are supplied with each Borset. Bars take a 3/16 in. tool bit.

Tool Adaptor

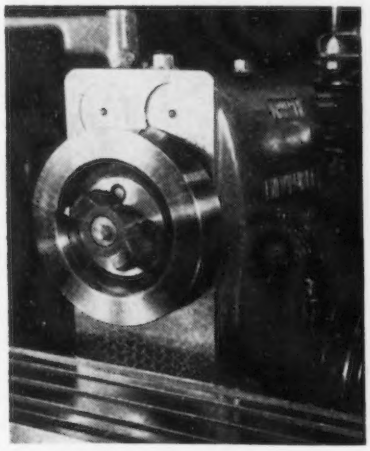
THE Model H adapter for screw machine tools is claimed to double the capacity of screw machines by *Boyar-Schultz Corp.*, 2110 Walnut Street, Chicago 19. It is designed to permit the use of more than one size tool in a single size screw machine. It is made in four sizes: ⅝ to ¾ in. short; ⅝ to ¾ in. long; ⅝ to 1 in. and ¾ to 1 in.



Flywheel Arbors and Adaptors

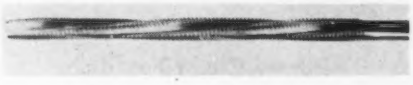
AS a simple adjunct to the use of carbide fly cutters, *Weddell Tools, Inc.*, 1239 University Avenue, Rochester 7, have developed simple flywheel arbors or adaptors. The standard shell end mill arbor is replaced by a flywheel arbor which mounts on the spindle of the machine. The nose of this combination arbor and flywheel is a replica of the nose end of the shell end mill arbor, onto which the milling or fly cutter is fastened and driven. For the use of cutters which fit directly on the spindle, a flywheel spindle nose adaptor

is offered. Both arbors and adaptors are made in standard sizes to fit standard machines or to replace standard end mill arbors.



Multiple Thread Taps

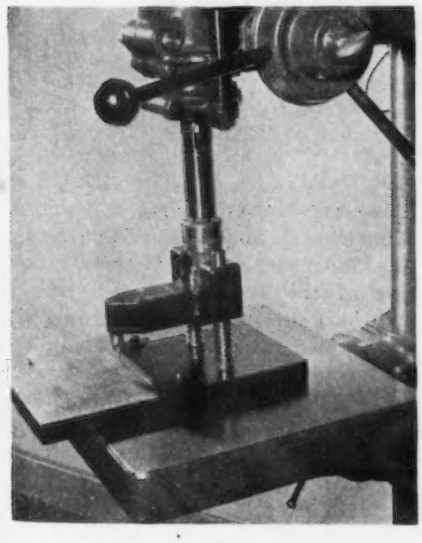
SPECIAL Acme multiple thread taps for threading of quick removable type fittings as used in aircraft assemblies for fastening cowling,



etc., are being produced by *Detroit Tap & Tool Co.*, 8432 Butler Street, Detroit 11. Sizes range from ⅜ to 1 in. diameter, both 12 and 10 pitch, while available types range from double to sextuple thread taps.

Offset Drill Head

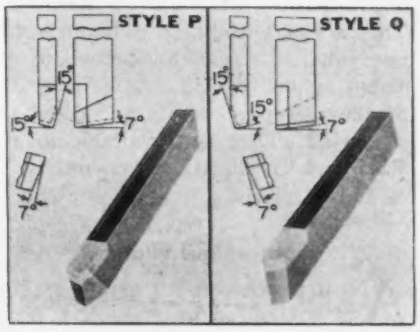
TO perform back spotfacing operations on parts where the holes to be spotfaced or countersunk are inaccessible to a standard tool mounted directly in the drill press spindle,



Edlund Tools, Inc., 4473 Woodward Avenue, Detroit 1, is manufacturing an offset drive. The tool consists of a body casting into which is built spur gear trains. The cutter spindle is rigidly mounted in a combination of ball and needle bearings to give maximum radial and thrust support. Cutters such as spotfacers and countersinks or a combination of both are available for an infinite variety of applications.

Stellite-Tipped Tools

TWO new styles of tipped tools, especially designed for machining steel, have been announced by *Haynes Stellite Co.*, Kokomo, Ind. Styles P and Q consist of a cutting tip of Stellite 98M2 cobalt-base alloy brazed or butt welded to a tough steel shank, with proper clearance and lead angles ground for turning steel. They are recommended for applications employing tools that have a large cross-section or tools that are bent or offset. Style P is a right hand tool, Style Q is a left hand tool. They are ground with a 15 deg. end cutting edge angle, a 15 deg. side cutting edge angle, a 7 deg. end relief angle and a 7 deg. side relief angle. They are furnished with flat tops so that users can grind their own rake ankles for each particular job.

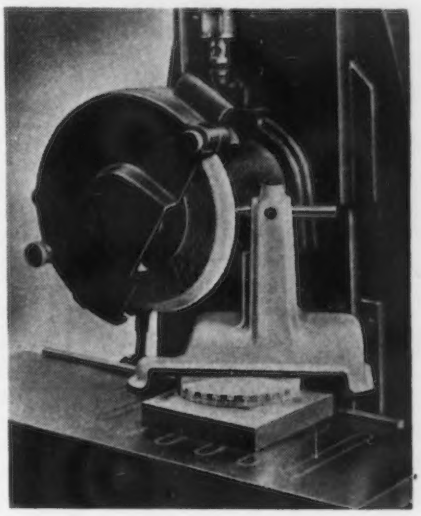


Broken Drill Remover

TO remove broken drills and taps from non-ferrous castings and machined parts, the *Mechemel Engineering & Sales Co.*, 4313 Lincoln Avenue, Chicago 18, has developed an electrolytic process which disintegrates and dissolves the embedded fragment of tap or drill. Certain blocking agents in the solutions prevent electrolytic attack upon non-ferrous metals and alloys so that there is no change in hole or thread dimensions when the broken fragment has been removed and the piece is ready for additional machining. A specially designed electronic unit operating on 110 volts a.c. controls the process.

Abrasive Wheel Dresser

A UNIVERSAL contour radius and angle dresser which enables an operator of limited experience to dress abrasive wheels accurately to virtually any contour has just been developed by the *Best Tools Corp.*, Rockville Centre, Long Island, N. Y.

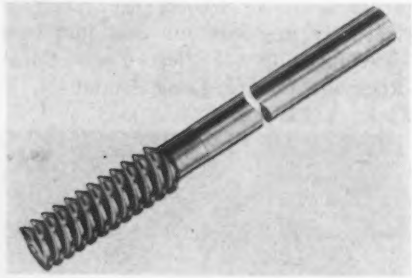


Contour dressing is accomplished by placing a steel template on a base which is held on the magnetic chuck. As the operator turns a knob, the tracer point follows the contour of the template and in turn the chisel pointed diamond generates the same contour on the abrasive wheel. Flexibility in radius and angle dressing is accomplished by changing the base. The travel of the head is 2 in., permitting angle and form dressing up to 2 in., and radii from 0 to 1 in., either concave or convex.

No-Mar Mallet

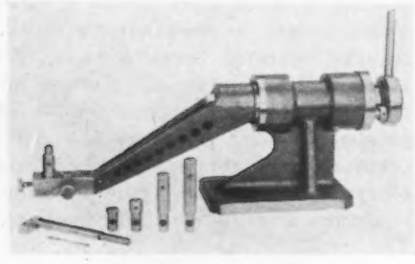
A NO-MAR mallet which has the "Hi-Eff" head, made of a special shock-absorbing material that hits hard without hurting, has been introduced by *Taylor Mfg. Co.*, 3056 West Meinecke Avenue, Milwaukee 10. It is designed for use by manufacturers of fine equipment, repairmen, tool and die shops and industrial plants where finely finished surfaces must be pro-

tected. Weights of 12, 18 and 24 oz. are available, but the heads of all three are of the same size and no weighted cores are used.



Rotary Broaches

A New technique in producing holes has been announced by the *Shearcut Tool Co.*, 19600 Sherman Way, Reseda, Cal. Because the tool is in effect a broach that rotates as it cuts, it is called a rotary broach. It removes metal by a shear cutting knife-like action and the chips resemble steel wool in form and texture. Since the cutting edge is in the form of a circle, there is no tendency to produce elliptical or uneven holes.



Radius Dresser

A PRECISION radius dresser with a capacity up to 4½ in. radius is announced by the *U. S. Tool & Mfg. Co.*, 6906 Kingsley, Dearborn, Mich. Model 45 is furnished with three different length diamond holder bushings. Graduations are etched on a chrome plated metal ring. A lock-stop on the spindle provides means for exact location of the radius desired on the wheel being dressed. The spindle is sealed against abrasive dust with leather closure seals.

Light Metals Grinding Wheel

THE characteristics of either aluminum or magnesium alloys tend to cause the face of the grinding wheel to load and become filled with the material quicker than is customarily experienced in grinding iron and steel. The *Waltham Grinding Wheel Co.*, 42 Emery Street, Waltham, Mass., has developed a special resinoid grinding wheel which does not follow the usual production recommendation in grinding aluminum or magnesium, but utilizes a semi-friable grain combining an open structure with a special treatment. These grinding wheels are already in service in several important producing foundries.

Grinding Wheels and Mount

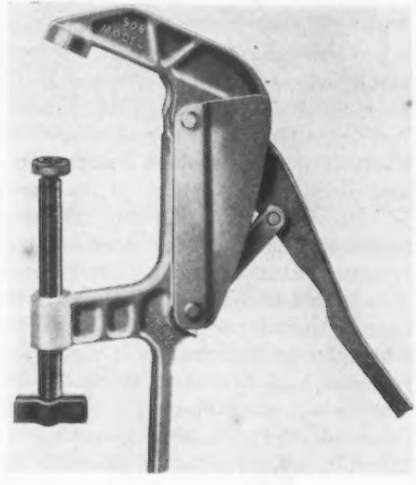
FOR use on carbide tool grinders is the new grinding wheel mount which, with supply wheels, permits worthwhile economies in money and time, according to the manufacturer, the *Sterling Grinding Wheel Division* of the Cleveland Quarries Co., Tiffin, Ohio. Once the holding fixture, known as the Easymount, is fastened to the grinder, new wheels can be put in place by tightening the retaining screws. Easymounts can be used on the following carbide tool grinders: Baldor, Bura-way, Critteron, Delta, Ex-Cell-O, Hammond, Heald, Prosser and Sellers. The wheels are supplied in coarse, medium and fine grains and in several diameters, heights, and rims.

Center Lapping Points

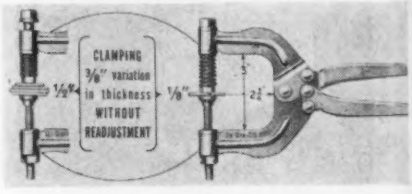
TO meet the extremely close tolerances demanded in thread grinding and o.d. grinding operations, *Bay State Abrasive Products Co.*, Westboro, Mass., has developed "Blue Flash" center lapping points for use on Ex-Cell-O center lapping machines. They are manufactured in blank form, then shaped, trued and sized, after mounting on the mandrel. The grits of these lapping points are fitted to the grind. They are available in all sizes and specifications, mounted on ½ in. mandrels.

Light-weight Clamp

AN improvement in its C-Clamp is announced by *Knu-Vise, Inc.*, 8th and Plum Street, Detroit. Model



505 incorporates greater strength and added throat capacity. A wing nut replaces the knurled head on spindle which adjusts the gap for the required thickness of the work. Once it is adjusted, the clamp remains at that exact setting.



Tool Clamp

A PORTABLE toggle clamp which clamps varying thicknesses without readjustment has been put on the market by the *Detroit Stamping Co.*, 346 Midland Avenue, Detroit. The De-Sta-Co. No. 470, with Pressure-Matic feature, is for use on sheet metal and other work where the individual parts to be clamped vary by as much as ⅜ in. in thickness on various locations of the same fixture group. A spring on one of the adjustment spindles provides for this variation.

Rotary Clamping Table

TWO new size Rotabs, 12 and 24 in., have been developed by the *Machine Products Corp.*, Detroit. The 12 in. size is of a compact design and is particularly adapted for easy mounting on the table of a milling machine. This model has a rotating

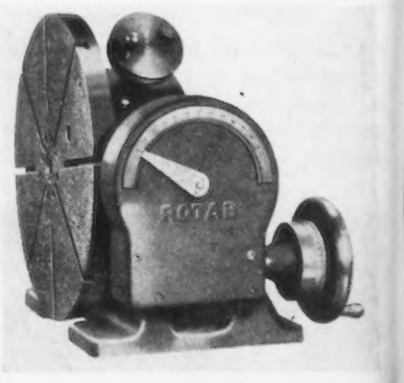


table to which the work is clamped. Considerable time savings in reclamping and resetting when new positioning of the same work is necessary can be gained. The 24-in. model can be adapted to a wide range of milling and boring operations. Both models have dials showing degree and minute graduations which register the angle of setting. A sine bar is furnished to provide greater accuracy on angular setting.

That's right . . . take a hair, magnify it 62.5 times . . . result — a husky rod. This is just what Jones & Lamson Optical Comparators do to those tiny dimensions that are difficult, or even impossible, to measure by any other means.

If you are a manufacturer of parts that must be right — to a hair — it will pay to investigate Jones & Lamson Comparators. These machines are designed for use in the shop (they don't have to be babied), and they can be used as easily as a mechanic's scale.

Jones & Lamson inspection engineers are at your service to study your particular measurement and inspection problems. Call on them today!

MEASUREMENT AND INSPECTION—BEYOND A SHADOW OF A DOUBT!

This book, "Beyond a Shadow of a Doubt" will be sent to executives asking for it on their firm letterhead.

J&L PROFIT-PRODUCING MACHINE TOOLS

JONES & LAMSON MACHINE COMPANY

OPTICAL COMPARATORS Springfield, Vermont, U.S.A.

Manufacturers of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

Assembly Line . . . .

STANLEY H. BRAMS

• The labor pot keeps boiling, with the U.A.W. board moving decisively to halt insurrection . . . Ford recognizes another union . . . Auto companies build Washington contacts.

DETROIT—Some six weeks ago Detroit started a flashback to 1937 and the industrial front crumbled under a bewildering variety of strikes, walkouts and labor disputes. Many saw the tempo and quantity of the strikes increase steadily. The CIO United Automobile Workers union board used some sharp words to admonish their members, but the members are not unaccustomed to harsh words from one quarter or another. Only last week did the UAW board take action that really impressed its membership and industrial management, and so may do some good.

The board was driven to suspending the 14 officers of Chrysler Highland Park Local No. 490 because they led a week long strike of 6500 workers at that plant. The affairs of the local were put in the hands of an administrator, Chrysler division director Leo Lamotte, for the next 60 days. After that period, a new election of officers will be held.

This was the first time an administrator has been appointed for a local since the war began, and only a few have been named since the early days of the UAW. The board thus served notice that it is growing tired of monkeyshines which are severely impairing its position with the government, the public and management—quite likely, too, in that order of importance.

The fact is that the sins of the UAW have come home, prodigally. For years it was accepted policy within UAW, probably as much in the international board as in the locals, to utilize the device of a "wildcat strike" to obtain a wanted end. The "wildcat" was planned as meticulously as the authorized walkout. When the tieup began, union officials piously wrung their hands, murmured inability to do much about it, urged the men—tongue in cheek—to go back to work, and stood by until at least a share of the wanted advantages were obtained. It was a classic John L. Lewis technique, and the UAW used it well.

But the members learned the tactic, too, and began to utilize it on their own. When the top officials wanted to go legitimate, the rank and file suddenly wouldn't let them. May's outbreak of Detroit strikes is in part the result of this conditioning of experience as well as of long habit.

THE union board indicated its irritation with unsponsored wildcats in the Ford Pratt & Whitney building fracas a few months ago, when it publicly backed up the company in discharging instigators. Last week's move, however, went a long step farther: The officers of a good sized local, rather than a few shop stewards, were taken to a transparent woodshed and threshed in the public eye.

On another segment of the turbulent Detroit labor front, the foreman's issue is awaiting action in War Labor Board hearings starting soon. (See page 87.) There are no kind words for Ford Motor Co., incidentally, around the rest of the automotive industry for the Rouge recognition of the Foreman's Association of America right at a time when the other manufacturers were fighting the movement tooth and nail.

There will likely be a rather similar lack of enthusiasm manifested at last week's Ford recognition of another new independent union, the Fraternity of Laboratory Workers.

The FLW is composed of some 800 laboratory workers, including chemists, physicists and metallurgists. They broke briefly into the news last January when they staged a two week strike at Ford over various unspecified grievances which evidently are being worked out through the medium of an agreement announced this week covering seniority and back pay. Wage rates and classifications will be treated in forthcoming negotiations. Leo J. Ryan, president of the laboratory men, said that efforts will be made to expand the new union into other plants.

The outlook for labor peace in Detroit quite obviously is none too good. Some labor people maintain that the "no strike pledge" is fast deteriorating because it does not represent what they call the "tripartite" agreement

READY FOR ACTION: *Tanks of an armored regiment roll onto the beach at Anzio beachhead, Italy, from the jaws of an LST in Anzio harbor. Note how spare treads are carried over the front of the tank.*

CRANKCASE PLATES

for one of the 9,000

October 1943 saw 9,000 planes roll from America's production lines. Proof that in nearly every operation of the thousands involved the airplane engine builders have invariably now settled upon Bullard machines for the job.

Bullard Vertical Turret Lathes with two heads working together provide that extra speed so necessary in today's production. Because of its rigid vertical structure it is trusted with work involving many of today's close tolerances.

After the war planes of the United Nations have done their work, and victory is ours, the adaptability of the V.T.L.s will be a "quick asset" held by their owners, as they face the demands of the world of tomorrow.

Spiral Drive Vertical Lathes Are Built in 24", 36", 42" and 54" Table Sizes. Also Cut Master Vertical Turret Lathes in 30", 36", 42", 54", 64" and 74" Sizes with Two or Three Heads.

Just 15 minutes is the time for rough turning and chamfering outside and inside radii on these counterweight plates for airplane engine crankcase on this Vertical Turret Lathe. This machine is in the plant of a famous California builder of engines.

BULLARD

THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT

which produced the pledge. Their attitude is that management and government must shoulder a share of the blame for breakdown of the pledge, as well as labor. As proof they cite the slowness and meandering policies of WLB, and they claim deliberate effort on the part of some 10 per cent or so of all managements to incite labor troubles which hurt labor's standing. These claims may be true and they may not; but it does not appear that labor's house is in such order that it can look too critically down the street.

The none-too-optimistic state of such relations leads to the likelihood that Washington will continue to figure importantly in industrial labor matters, not only during the war and not only during the Roosevelt administration, but for a lengthening period ahead.

Detroit does not like this and does not particularly admit it, but actions speak louder than words. The automobile companies are giving very solid indication that they expect federal controls to hold as firm during the forthcoming postwar period as they are today.

If exponents of free unhindered enterprise are to be found anywhere, for instance, they could be found in Chrysler Corp., whose officials follow implicitly the doctrines of old fashioned, rugged individualism. Chrysler people look with a jaundiced eye on anything which gives indication of impairing their corporate freedom of action. But it quite obviously expects to have to do business with Washington. K. T. Keller, president, lately selected an assistant for the first time in the corporation's history, and he is James Cope, formerly head of the Washington office of the Automobile Manufacturers Assn., evidently chosen because of Cope's knowledge of the ways around Washington.

Confirmation of this hypothesis comes in the newly announced appointment of Charles W. Bishop as assistant to A. Vander Zee, vice president of sales of Chrysler. Bishop was formerly general counsel of the National Automobile Dealers Association, which is considered in many quarters to have done the best lobbying job of the entire war in Washington. Bishop also evidently knows his way around the capital, and Chrysler wants to use that talent.

STUDEBAKER'S vice - president, Courtney A. Johnson, one of the policy makers for the South Bend firm and its Washington contact man, joined Chrysler's dipping into the Automobile Manufacturers Association and chose Herbert Hughes as his assistant. Hughes worked with Cope in the Washington office of the AMA, particularly concerned with governmental regulations applicable to manufacturing.

General Motors Corp., meanwhile, has enlarged its Washington representation with the addition of a full time public relations office in the capital, headed by Don C. Hogate, hitherto stationed at Detroit, with particular assignment lately to labor matters. General Motors has always maintained fair sized representation in Washington, particularly since the war began, but this is the first time the offices augmented to the point of including the public relations angle.

Ford is represented also in this movement, having recently selected as a Washington staff addition Clifford A. Prevost, anti-New Deal newspaperman who headed the *Detroit Free Press* bureau in the capitol.

Hardest Part of the War Is Ahead Nelson Warns Cleveland Industrialists

Cleveland

• • • **Donald M. Nelson**, WPB chief, here on what appeared to be a pep meeting for labor and industry last week, revealed that while $210-billion in war contracts had been placed and mainly produced since Pearl Harbor, at least $75-billion more must still be produced. Stressing that the hardest part of the job was still ahead he urged that public apathy and tiredness of the war not be permitted to jeopardize war output. He stated that the next three to five months must see this nation's greatest production effort culminated.

Mr. Nelson said that steel production, if held at present levels throughout the summer, would just about "skim us through." Other authorities have been pointing to the fact that at least a five to six per cent steel decrease could be expected during the hot weather which would seem to offer some doubt as to the adequacy of steel.

Mr. Nelson revealed for possibly the first time publicly that "we underestimated the amount of artillery needed to blast the German from his lair," which to some extent explains the lateness of the current big gun artillery ammunition programs.

Nelson also said that on his recent trip to Russia he found the Russians greatly admiring American "know-how." When questioned, he stated that some American engineers are still in Russia but that the Russians are now mainly dependent upon their own engineers. He mentioned seeing engineers of both Badger Engineering and Bell Aircraft there.

Mr. Nelson stated that postwar advantage seeking and public tiredness of the war must not be allowed to injure the programs now. He favored vacations for workers and declared them necessary, but asked that each worker remaining during vacations do an extra stint.

Manpower shortage was charged with major responsibility for delayed production and the fact that 212 plants here are behind production schedules was brought out. He emphasized that help for this situation was a local job which could not be "master-minded" from Washington.

Manpower, he said, must be backed by better planning to cut absenteeism, labor hoarding and turnover, and to obtain better individual efficiency. Closer scheduling of programs and particularly component programs was also seen an imminent necessity.

The greatest bottlenecks in America today, Mr. Nelson said, are the foundries and forge shops. He said that every special measure possible is and will be taken to try to boost output and stabilize manpower in these industries.

Nelson's preference for local solution of most problems of production would seem to indicate even further decentralization of WPB powers in the future.

G-M Expands to Build New P&W Aircraft Engines

• • • **Chevrolet Motor Division** of General Motors will expand its two Buffalo plants for the manufacture of new 18-cylinder Pratt & Whitney aircraft engines. The expansion program will cost $1,000,000. The plants already have built more than 39,000 14-cylinder P&W engines and this production will continue at one factory.

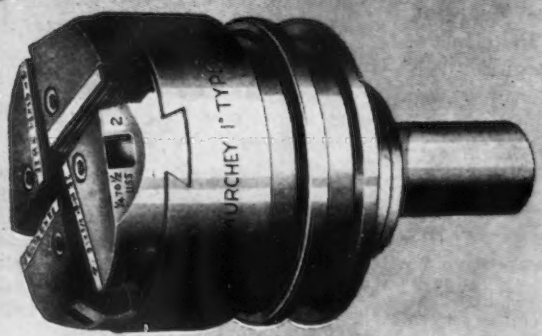
KEEPING AHEAD OF THE TIMES

MURCHEY

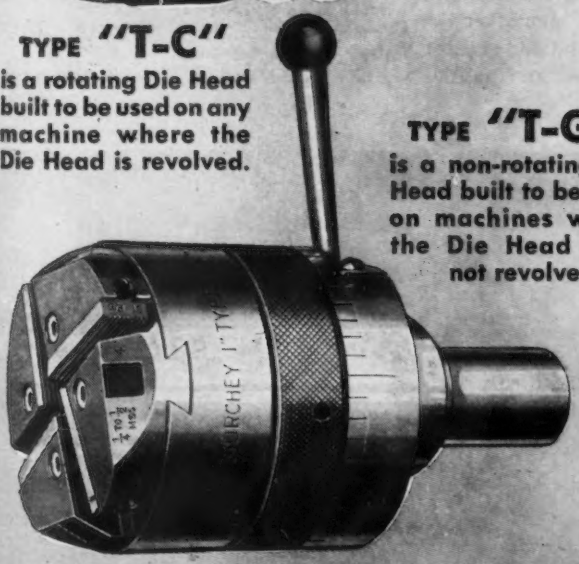
Now Offers

NEW AND IMPROVED TANGENT CHASER SELF OPENING DIE HEADS!

..4 WEEKS DELIVERY..



TYPE "T-C"
is a rotating Die Head built to be used on any machine where the Die Head is revolved.



TYPE "T-G"
is a non-rotating Die Head built to be used on machines where the Die Head does not revolve.

MANUFACTURED of Special Alloy Steel, hardened and ground throughout, these Die Heads (Model "T" series) are expressly made to cut accurate threads on long production runs. They are designed to use Tangent Chasers—giving long chaser life; permanent throat; uniformity of finished work throughout the entire life of chasers and interchangeability of chasers.

Send for literature

Also ask for literature on Collapsible Machine Tap; Self Opening Die Heads; Thread Milling Machines; Tapping Machines and Roller Pipe Cutting-off Machines.

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MURCHEY

Washington . . . L. W. MOFFETT

• WMC cuts down on regional referment of workers . . . People wonder if WPB is winding or unwinding . . . WPB contends CMP is success.

WASHINGTON—WMC has cut down on regional referment of workers because there has been a continuing demand for about 30,000 workers monthly and only 20,000 workers available for inter-regional referment.

The WMC has stopped all inter-regional referments of workers to steel mills with the possible exceptions of the Geneva Steel Co. at Provo, Utah, and the Republic Steel Corp. at South Chicago, Ill. The reason these latter plants are receiving WMC help is that they have secured large portions of the increased shell steel program.

* * *

• **One of the greatest** points of disagreement around WPB is whether the historical quota basis used in limiting production should be employed in resumption of civilian production and continued into the readjustment period. Many manufacturers making civilian articles now have grown fond of the quota system and would like to go on with it so long as there are any government controls over production.

Small producers argue that the preservation of the quota system will unduly prolong competitive advantages enjoyed by larger companies and in the end stifle competition completely.

* * *

• **A great many people** are wondering what WPB is doing now, "winding or unwinding." The question is being asked, if officials were convinced last November that there should begin to be greater relaxations of restrictions, why the country has to wait until after the invasion is proved successful before letting the bars down to a greater degree.

A good many material restrictions have been lifted, but a majority of the orders which permit resumption of civilian production generally are still standing. Relaxations by way of appeal procedure are slowly gaining ground.

Some WPB big-wigs say that the tendency is to "wind" in the tight labor areas, and "unwind" in the looser labor areas, and that the agency is irrevocably committed to this policy. The inherent danger in this procedure is the possibility of unwarranted creation of tight labor areas to prohibit increased non-military production.

* * *

• **The weight of** steel company arguments is undoubtedly impressing Steel Panel members, but the question is still up to the War Labor Board itself, and the President. Panel members have not tried to disguise their boredom when bored, and have showed by their attention when their interest has been held. The panel was clearly absorbed in listening to the guaranteed annual wage and "carry back" presentation made last week by Enders Voorhees, financial executive of the U. S. Steel Corp.

The promise of greater contact with government by business men after the war has created a demand for greater knowledge of government and politics on the part of industrialists. Some industries which have close connection with the consuming public will not find it so hard to find men within ranks who will prove to have personalities pleasing to the public, but the consensus is that there are really few executives who qualify as first-rate business-men-statesmen.

Perhaps this demand will create a market for the services of "lame-duck" Congressmen who have had a business background. The fact is that Congress may well develop into a sort of proving ground for the type of executive big business will need after the war.

* * *

• **In support of** WPB's contention that CMP is doing what it is supposed to do, official figures reveal that there was a slight improvement in the first quarter of the percentage of shipments to orders accepted during the period as compared with the third quarter of 1943. Third quarter 1943 was 99.74 and the first quarter 1944 was 100.57.

The following table stated in net tons, shows how well CMP is continuing to operate:

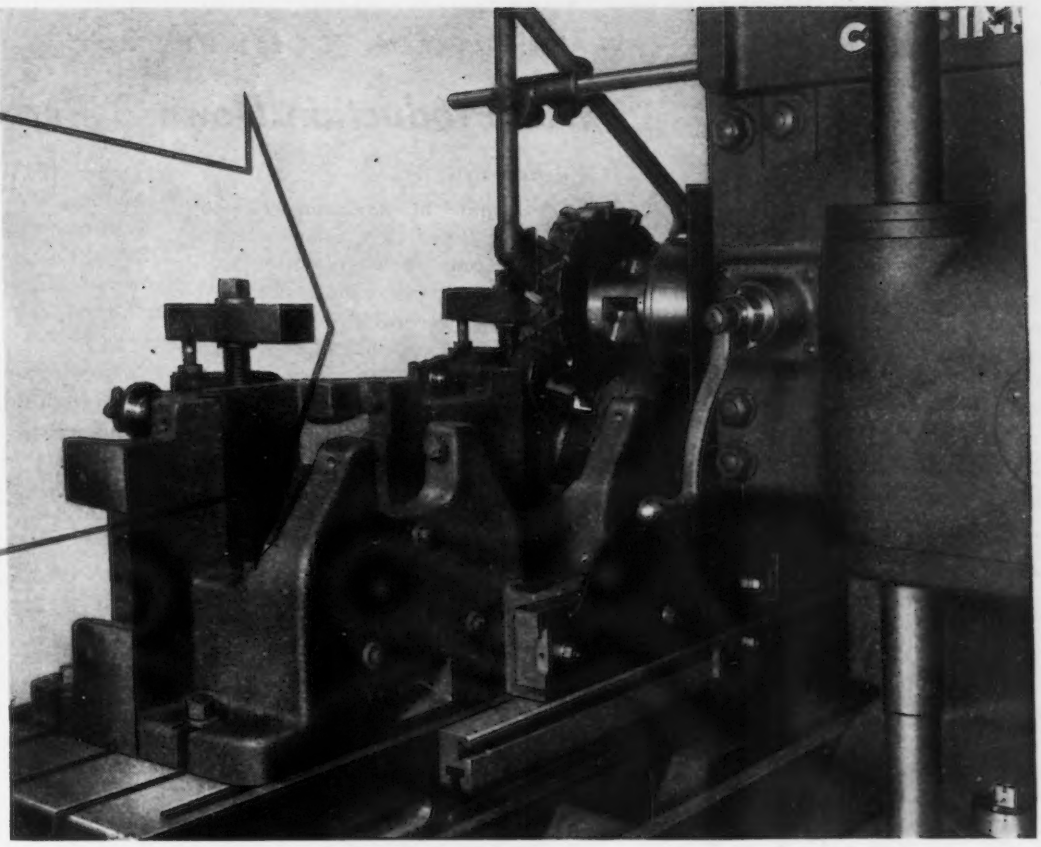
	3rd Quarter, 1943	1st Quarter, 1944
Estimated supply.....	17,253,000	16,695,000
Requirements submitted	23,837,000	21,252,000
Allotments	19,302,000	19,045,623
Orders accepted	16,093,613	17,045,623
Current orders shipped	14,635,296	15,563,374
Shipments, including carryovers	16,052,539	17,173,539
Per cent of shipments to accepted orders...	99.74	100.57

o o o

CONGRATULATIONS: *Secretary of War Henry L. Stimson (left) congratulates Lieut. Gen. William S. Knudsen (center), production director, after the presetnation of the Distinguished Service Medal in Washington. Secretary of War Robert Patterson looks on.*

o o o

Illustration of part being milled is shown above. Color indicates milled surfaces. The machine (tooled up by CINCINNATI engineers) is a 5-48 Plain Tracer Controlled Hydromatic equipped with variable feed attachment; high headstock for increased vertical range; long quill and spindle for extended cross range; and inserted tooth cutter, 13" diameter by 3-1/16" wide.



Tracer Controlled HYDROMATICS

CINCINNATI Plain Tracer Controlled Hydromatic. Also available in Duplex Style. Catalog M-1295 contains complete specifications on both styles.

Get the corners, too!

ALMOST any milling machine can mill straight across a surface in a horizontal or vertical plane, but it takes a particular type of machine to profile mill around a boss and get the corners that would be missed by a conventional miller. The CINCINNATI Tracer Controlled Hydromatic in the illustration above does the job *automatically;* milling the counterweight surface of aircraft engine crankshafts, while profiling around the center bearing, like this: ⌒

The equipment, engineered by CINCINNATI includes two hand clamping fixtures. Automatic feed cycles (a feature of all Hydromatics) permit the operator to devote his entire attention to the productive job of loading and unloading the fixtures, working at one station while the other is cutting. Automatic variable feed is also included, as a necessary adjunct to tracer controlled milling.

This method of milling introduces new possibilities in economical shop practice. Our engineers will be glad to tell you about CINCINNATI Tracer Controlled Hydromatics, and to apply the tracer controlled method of milling to your present and future requirements.

CINCINNATI

THE CINCINNATI MILLING MACHINE CO. CINCINNATI, 9 OHIO, U.S.A.

TOOL ROOM AND MANUFACTURING MILLING MACHINES... SURFACE BROACHING MACHINES... CUTTER SHARPENING MACHINES

Producers who have been concerned about over-allotments have not had the benefit of WPB experience in what happens which over-allotments are made. Steel Division officials say in most cases the over-allotments are taken up by cancellations and cutbacks, and that WPB is careful to spread over-allotments and to never give out more allotments than experience indicates will be cancelled or not used.

Steel and Aluminum Workers CIO Unions to Consolidate

Cleveland

• • • **Delegates to** the International convention of the USWA-CIO here recently unanimously authorized the international officers and the executive board to complete a merger of the United Steel Workers of America with the Aluminum Workers of America, two CIO unions, according to a report in *Steel Labor*. Preliminary negotiations have been in progress, and the Aluminum Workers union is expected to approve the merger at the convention at Hot Springs, Ark., in June.

The principal purpose of the merger, Philip Murray said, is to organize the unorganized aluminum industry. The Aluminum Workers

War Production Down 3 Per Cent in April

Washington

• • • **Output of munitions** during April was 3 per cent below schedule and 2 per cent below the March level, back at almost the same level as during January, according to a report by Donald M. Nelson, chairman of WPB. The April production record of the major munitions categories, in relation to March output and to schedule for the month, is revealed in the following WPB production index.

Commodity 666	March Comparison, Per Cent	Schedule Comparison, Per Cent
Aircraft and aircraft components	minus 7	minus 4
Ships, including repair and maintenance	no change	minus 2
Guns and fire control	minus 3	minus 5
Ammunition	plus 5	minus 4
Combat and motor vehicles	minus 5	minus 2
Communication and electronic equipment	minus 1	minus 3

Mr. Nelson said that the schedule for the coming months calls for a continuing increase in output, with the production peak planned for November. At this peak, output is planned to be 10 per cent higher than was reached in April.

Present output, he said, is 3 per cent below the previous peak of November, 1943. Part of the production declines in January and February were scheduled downward, but the falling off in April is a definite lag behind the rising schedule that was planned from March until November, 1944.

April aircraft output, 30 per cent of all munitions production, was 8343 airplanes delivered and the total airframe weight produced was 96,400,000 lb. By numbers, aircraft deliveries were 4 per cent under the April 1 schedule, and in terms of airframe weight, production was 5 per cent below the March level, due to the shorter work month. Weight output per working day hit a new record of 3,856,000 lb.

The *Monthly Production Index* of WPB, based on August, 1943, standard costs, shows that preliminary figures for April are the second highest this year, being surpassed only by March production. With November, 1941, as 100, the index shows that for the first four months of 1944 the figures were: 646,636,667, and 652. The April, 1943, index figure was 547.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

Lukens Purchases Bethlehem Property at Coatesville, Pa.

Coatesville

• • • **The purchase by** Lukens Steel Co. of the Coatesville property owned and operated since 1923 by Bethlehem Steel Co. was announced this week. The Bethlehem properties involved in this transaction cover approximately 35 acres.

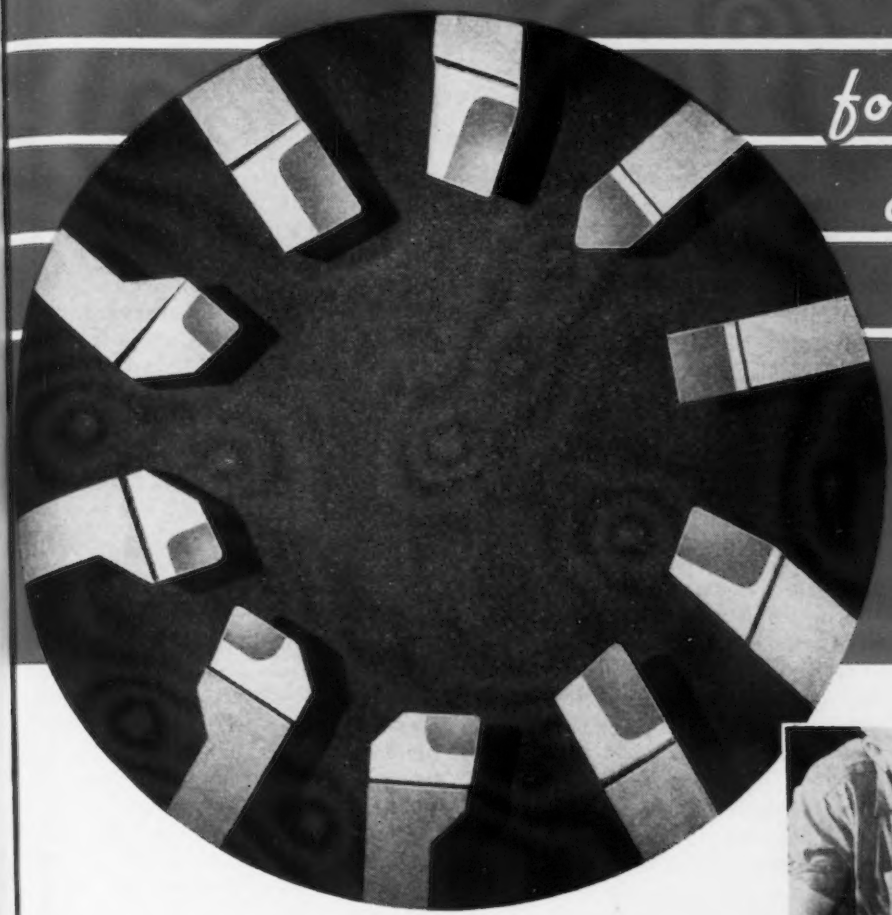
First mention of this sale was made in The Iron Age Feb. 24, 1944, page 47.

Lukens will renovate and occupy the Bethlehem office building, but equipment in the charcoal tube plant will be dismantled for salvage. The buildings and yards will be utilized for storage of materials and scrap, according to present plans.

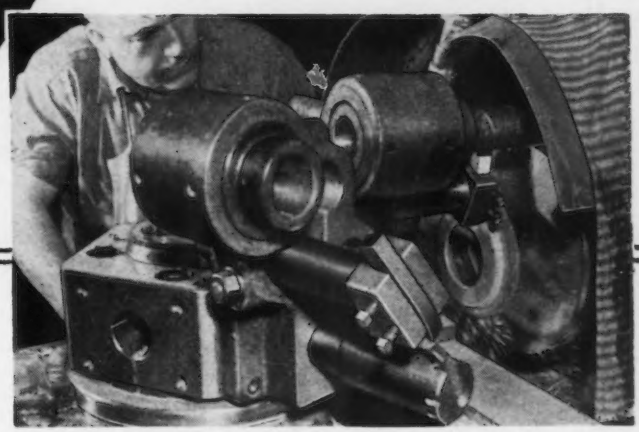
Manufacturing operations at the plant are being discontinued.

Standards are "TOPS"

for 60%·80% of your TURNING, BORING, FACING



AVAILABLE FROM STOCK
IN 10 STYLES—5 GRADES
AND ALL COMMON SIZES



Machining time reduced, tool life increased, hand polishing time cut 80%, on this steel aircraft gear. Typical of the many benefits of Standard Carboloy Tool use.

USE OF Standard Carboloy Tools has swiftly spread since their introduction until today practically every major war plant machining metals now uses "standards" to step up production and step down costs. Here's why:

Standard Carboloy Tools are top quality carbide tools at prices generally comparable to other cutting materials. Designed in 10 standard styles adaptable to 60% to 80% of all single point turning, facing and boring work. When required, these "standards" can be quickly ground to many special shapes and put on the job *fast*. Eliminates need for large, complicated stocks of "specials". Permits minimum tool inventories. Simplifies handling and ordering. Can be converted readily to peacetime production.

Specify *Standard* Carboloy Tools for top performance, top economy. 10 styles, 5 grades, wide range of sizes—for cutting steel, cast iron, non-ferrous and non-metallics. In stock for prompt delivery. Write for new catalog GT-175.

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TRADEMARK

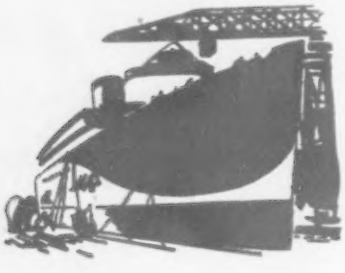
For Cutting CAST IRON and Non Ferrous Metals

For Cutting STEEL

TUNGSTEN CARBIDES ★★★ TUNGSTEN CARBIDES WITH TANTALUM AND/OR TITANIUM CARBIDES

WEST COAST . . . OSGOOD MURDOCK

• Foundry pig iron so short temporarily that there's suggestion of all-rail shipments from Birmingham . . . Of 6000 tons rated daily furnace capacity, present practical maximum scarcely over 2000 tons.



SAN FRANCISCO—"How can foundry pig iron be short on the West Coast after five big, new furnaces have been added to the one little one that sufficed prewar, with a current daily capacity on paper of approximately 6000 tons instead of the prewar trickling 530 tons?"

That has been the natural inquiry of foundry buyers and well posted steel laymen in the Far West these last few weeks. There has even been talk of shipping pig iron all-rail from Birmingham. Absurd and preposterous, you say. Of course, it is, but it may happen.

At Fontana, the Kaiser 1200-ton stock is said to be averaging 1000 to 1100 tons. Despite Mr. Kaiser's claim in Cleveland a week or two ago that present ore supply is good for at least seven years, members of the trade on the West Coast and experienced minerologists report that high sulphur is a problem and that the single limited source of mediocre ore prevents mixing and handicaps maximum production. Under these circumstances the furnace has performed remarkably well and great credit reflects upon the operating personnel.

Because of the new $25,000,000 ordnance contract for shell case forgings, it is understood that the Fontana furnace and open hearths must operate to capacity these coming months to provide sufficient ingots for both the plate rolling mill and the new forging plant. This should help to "restore the metallic balance" in the scrap market, so long and earnestly desired by WPB.

All other furnaces are in Utah. Columbia's old reliable 25 year old Ironton No. 1 has been under constant pressure for five or six years and must be shut down for complete relining and overhaul that will put it out of service for from 45 to 60 days. Basic pig is now being stored to carry over. Its capacity is something like 600 tons a day. Ironton No. 2, the ancient white-elephant stock from Joliet, Ill., which DPC dismantled, moved west and re-erected is down "for the duration" which undoubtdly means forever. It proved impractical, obsolete and virtually impossible to operate continuously, 800 odd tons a day on paper that cannot be counted upon.

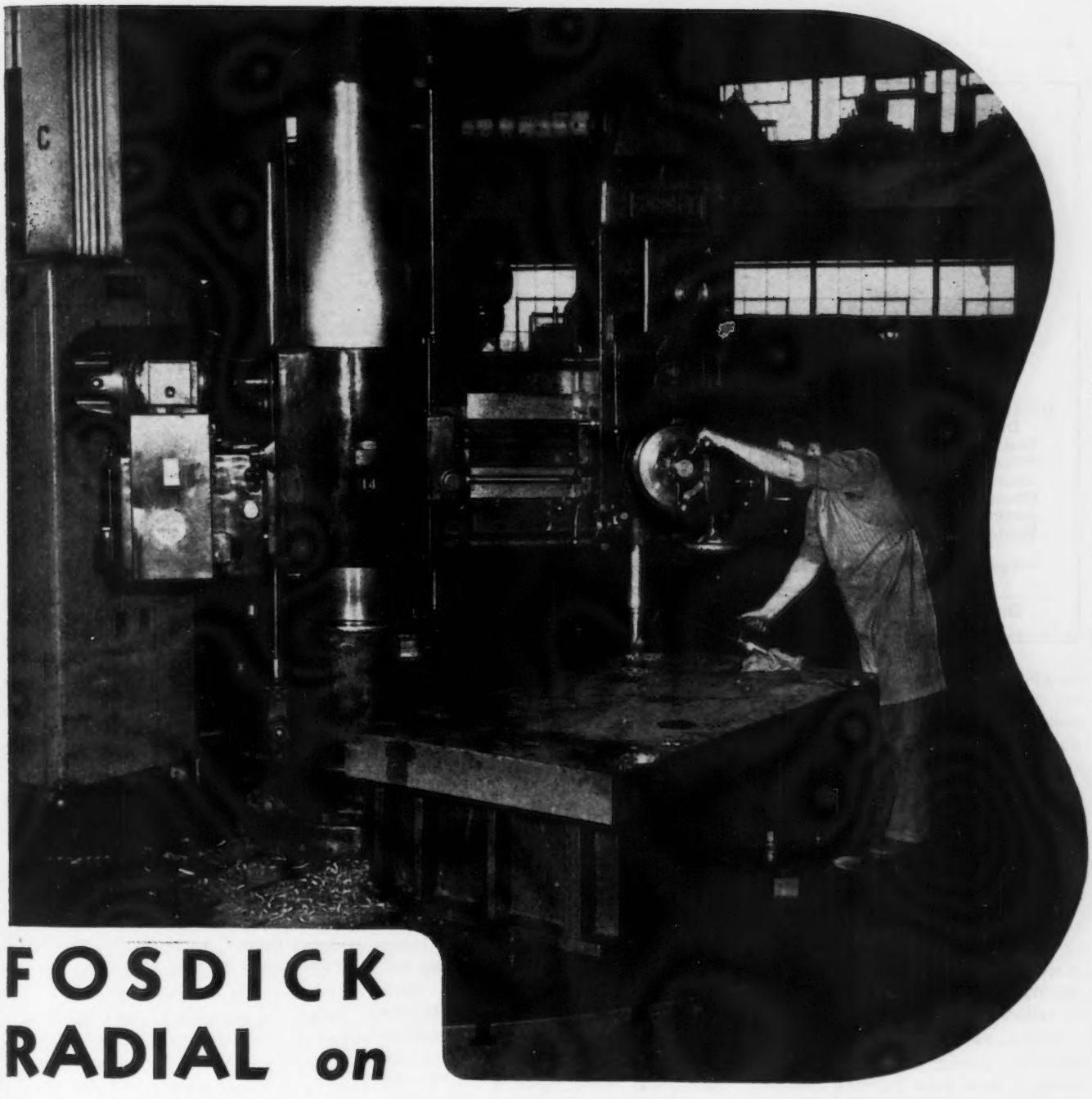
Of the three Geneva furnaces, each rated at 1100 tons a day, only two are in operation and combined are producing an average of 1100 or 1200 tons. To keep the plate mill even in limited operation without outside scrap requires practically the entire pig iron output presently available.

To produce foundry pig it is pointed out that one of these West Coast furnaces must operate continuously for a 30 day period on that grade, and such operation is subject to order and allocation from the Steel Division of WPB. In Utah, both Geneva Steel Co. and Columbia Steel Co. are experiencing extreme difficulty in recruiting sufficient labor in the coal and ore mines and at the mills to step up production. The third Geneva furnace was scheduled for blowing in during March but even if it were ready, labor and raw materials would not be available, it is reported. While labor is siphoned away to man shipyards, war ordnance plants and high wage payrolls and while the cream of the scrap rolls eastward for midwestern furnaces, the way of the far western blast furnace and open hearth operator is indeed hard.

FOUR West Coast Maritime shipyards are now in the midst of schedules for the construction of 117 AP-5 attack transports, all of which vessels are to be completed and delivered by the end of the year. Oregon Shipbuilding Corp. at Portland will turn out 36; California Shipbuilding Corp. at Wilmington, 32; Vancouver, Wash., Kaiser yard, 27; and the Richmond No. 2 Kaiser yard, 22. This is a Victory ship hull especially finished for the accommodation of personnel.

It is for these vessels that metallic ballast will be required. Scrap and salvage divisions of WPB are anxious that such ballast be rolled or cast from scrap, pointing out that this will utilize contaminated material, can be handled in idle foundries or open hearths and can be formed so as to lie flat in the hold of these ships, between the ribs to permit storing maximum cargo. Cost of such ballast could not be less than $40 per ton delivered. Cast concrete beneficiated with hematite or other heavy ore can be supplied for less but is dirtier and more difficult to handle and not so heavy. Many ship operators favor pig iron, since it can be obtained on the West Coast for $27 per gross ton and since it has full value as raw material when removed. To ballast 117 big cargo vessels as troop carriers require a sizable tonnage of deadweight metallic material.

"FOR what purpose are these 8-in. and 155-mm. artillery shells which the steel industry has recently been commissioned to forge?" In answer to this question, Col. K. B. Harmon, district chief, Army Ordnance, here, has released for publication an interesting resume. He explained that the Sicilian and Italian campaigns proved tanks were of limited value because of the difficult mountainous terrain. On the Anzio beachhead, tanks could be employed only as auxiliary artillery. The Italian campaign has demonstrated also the limitations of air power. . . . "It has been the American battle practice to follow up heavy air bombardment with equally heavy artillery bombardment. . . . For the landing on the continent, General Eisenhower has available quantities of the mobile 4.5-in and 155 mm. guns. The former is a long barreled, extremely accurate piece



FOSDICK RADIAL *on*

special circular base . . . saves time . . . insures accuracy

● Drilling large diameter holes in tough metal is one way that the Fosdick Radial demonstrates its ability to handle tough assignments . . . It also shows how Fosdick rigid construction aids productivity and meets close tolerance demands . . . Fosdick Hydraulic Radials have "what it takes" to maintain precision production — well balanced arm and head construction — and finger tip control of all feeds and speeds in the head . . . Want further details? Write for Radial Bulletin RI.

FOSDICK MACHINE TOOL COMPANY
CINCINNATI 23, · · · OHIO

APRIL BLAST FURNACE PRODUCTION—NET TONS

Source: American Iron and Steel Institute

	Annual Blast Furnace Capacity	PRODUCTION							
		Pig Iron		Ferro Manganese and Spiegel		Total		Per Cent of Capacity	
		April, 1944	Year to Date	April, 1944	Year to Date	April, 1944	Year to Date	April, 1944	Year to Date
DISTRIBUTION BY DISTRICTS:									
Eastern	12,815,680	903,413	3,771,130	23,626	86,813	927,039	3,857,943	88.2	91.0
Pittsburgh-Youngstown	26,852,460	2,136,336	8,490,667	18,581	90,971	2,154,917	8,581,638	97.8	96.6
Cleveland-Detroit	6,620,500	552,645	2,128,534	.....	.....	552,645	2,128,534	101.7	97.2
Chicago	13,575,540	1,086,418	4,492,097	.....	8,780	1,086,418	4,500,877	97.5	100.2
Southern	4,822,790	363,856	1,397,722	9,511	58,396	373,367	1,456,118	94.3	97.4
Western	2,372,900	149,024	557,017	.....	.....	149,024	557,017	76.5	71.0
Total	67,059,870	5,191,692	20,837,167	51,718	244,960	5,243,410	21,082,127	95.3	95.5

During 1943 the companies included above represented 99.5 per cent of the total blast furnace production.

weighing about six tons. Its companion piece uses the same interchangeable high speed carriage. Mounted on pneumatic tires it may be moved speedily over good roads and can travel anywhere a truck can go. The complete gun weighs about 15 tons and hurls a 95-lb. projectile over 15 miles. . . . In the event of seige warfare, Ordnance has ready such heavy long-range guns as the 8-in. howitzer, the 8-in. gun and the 240-mm. howiter. From the 8-in. howitzer a 200-lb. shell is fired through a plunging trajectory a distance of approximately 11 miles."

For more than a year the Yuba Mfg. Co., former constructors of gold dredges, has been building 155-mm. howitzers at Benicia, Cal. Forged tubes for these guns are received from an Army arsenal in New York for complete machining of the exterior and interior surfaces, and mounting and fabrication of the breach and firing mechanisms. The guns are then returned to the New York arsenal for mounting and trial firing. This is the only private plant in the nation that performs this complete operation on this vital gun.

* * *

• **Addenda on freight rates:** Under Section 22 of the Tariff Act, the following additional rates have been voluntarily filed by the Union Pacific and connecting carriers applicable on finished steel plates, structural shapes and bars from Geneva to Pacific Northwest terminal ports. They have not yet been accepted by DPC. These rates apply only on government-owned products to government agency consignees. These rates are: To Portland, Ore., and Vancouver, Wash., $9.50 per net ton; to Tacoma and Seattle, Wash., $10 per net ton; to Everett and Bellingham, Wash., $10.50 per net ton. The Union Pacific and Western Pacific had previously filed a Section 22 rate from Geneva, Utah, to San Francisco and Los Angeles terminal ports at $8 per ton (THE IRON AGE, May 18).

* * *

• **Marine machinists** and riggers at Oregon Ship, Portland, have slashed the time for setting in place Victory ship propulsion machinery from three days to six hr. The assembly weighs 125 tons completely installed and includes the 12-ft. diameter bull gear, two intermediate reduction gears, a gear cover, the high and lower pressure drive pinions, reduction gear covers, the main condenser and the high and low pressure turbine units.

* * *

• **It won't be long** apparently before West Coast shipyards go onto two 10-hr. shifts. Aircraft plants have operated on this basis fairly successfully for some time. Rear Admiral Howard L. Vickery, vice-chairman of the U. S. Maritime Commission, has assured everyone that no change will be made without full concurrence by management and labor. But Paul R. Porter's "stabilization" conference at Portland artfully side-stepped this among other questions.

. . . Cited for Awards . . .

• • • **The following companies** have won the Army-Navy E award for outstanding war production:

Douglas Aircraft Co., Santa Monica Plant, Santa Monica, Cal.
Pacific Screw Products Corp., South Gate, Cal.
Alloy Steel Gear & Pinion Co., Chicago. (second star)
Farrel-Birmingham Co., Inc., Ansonia, Conn. (fourth star)
Industrial Gear Mfg. Co., Chicago.

Maritime M

Kaiser Co., Fontana, Cal.
General Electric Co., River Works, Lynn, Mass.
Jones & Laughlin Steel Corp. (star)

American Bridge Co., Elmira Heights, N. Y.
Arnold, Schwinn & Co., Chicago.
Atlas Metal Stamping Co., Atlas Tool & Designing Co., Philadelphia.
Atwood & Morrill Co., Salem, Mass.
Aurora Pump Co., Aurora, Ill.
Barden Co., Danbury, Conn.
Binswanger & Co., Memphis, Tenn.
Carolina Industries, Sumter, S. C.
Cities Service Oil Co., Hillside, N. J.
Commercial Radio Equipment Co., Kansas City.
Horace E. Dodge Boat & Plane Corp., Newport News, Va.
Emsco Derrick & Equipment Co., Houston plant, Houston, Tex.
H. J. Freezer Co., York, Pa.
General Electric Co., Syracuse, N. Y.
General Motors Corp., Pontiac, Mich.
Gunderson Brothers Engineering Corp., Portland, Ore.
E. Ingraham Co., Bristol, Conn.
Jackson Saw Mill Co., Jackson, Tenn.
Lloyd E. Jones Co., Chattanooga, Tenn.
Murray & Tregurtha, Inc., Quincy, Mass.
Rutherford Machinery Co., Rutherford, N. J.
Square D Co., Kollsman Instrument Division, Flushing, L. I.
Sullivan Machinery Co., Claremont, N. H.
Rudolph Wurlitzer Co., DeKalb, Ill.
Okonite Co., Passaic, N. J.
Charles T. Brandt, Inc., Baltimore (fourth star).
Kresky Mfg. Co., Petaluma, Cal.

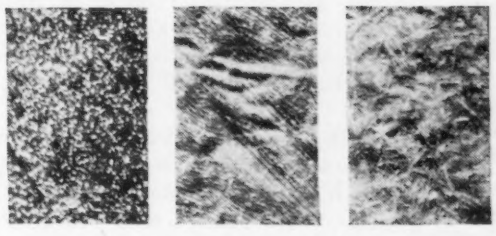
Here's a PAINTABLE Galvanized Sheet for Your New Peacetime Products

In most new and improved sheet metal products of the postwar years, long service life will be just as important as attractive appearance. Here ARMCO Galvanized PAINTGRIP sheets offer you decided advantages over ordinary galvanized metal.

This original Bonderized galvanized sheet requires no preparation for painting. The phosphate film insulates the paint from the zinc and holds it several times longer than an acid-etched galvanized surface. These photomicrographs tell the story.

The "Scratch" Test

This test shows how paint adheres to PAINTGRIP. The top of the sample is Bonderized. When scratched with a pen knife only a superficial mark is noticeable. Paint on ordinary galvanized (bottom half) comes off readily.

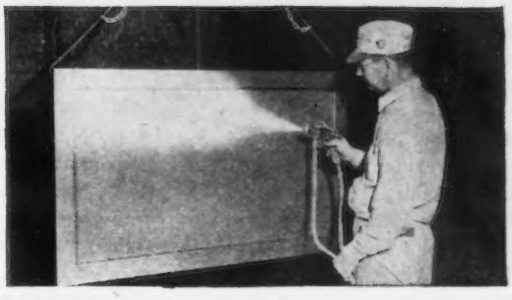


A B C

A This magnification shows that an ordinary galvanized sheet appears slick and difficult to "coat" with paint.

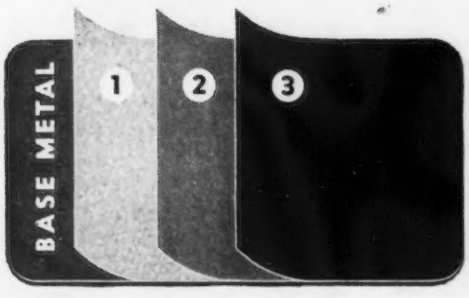
B Ordinary galvanized after acid etching. The etching has removed part of the protective zinc coating.

C Compare the mat-like paint-holding surface of ARMCO PAINTGRIP with that of the others. No coating has been removed and paint is insulated from the zinc.



Immediate Painting

ARMCO PAINTGRIP can be painted immediately. No costly acid etching or primers are needed. Thus the *full weight* of the protective zinc coating is preserved intact.



What Paintgrip Is....

1. **A full zinc coating under—**
2. **ARMCO PAINTGRIP: A mill-applied Bonderized finish that insulates zinc from—**
3. **Paint or enamel that can be applied in any color.**

If you see advantages here for your products, in reducing fabricating costs and stepping up peacetime sales, we'll be glad to discuss the use of ARMCO PAINTGRIP. Write for illustrated booklet. Just address The American Rolling Mill Company, 2111 Curtis Street, Middletown, Ohio.

GALVANIZED PAINTGRIP ARMCO STEEL

The American Rolling Mill Company

PERSONALS

° ° °

• **O. James Smith** has been named Detroit branch manager of Clawson & Bals, Inc., Chicago, subsidiary of Bohn Aluminum & Brass Corp. He was formerly with Electric Auto-Lite Co., and later with the War Department, Ordnance Division.

• **Edward W. Hoyle,** known to the plating, polishing and buffing industry for more than twenty years, has joined American Buff Co., Chicago.

• **T. R. Porter** has joined the staff of North American Philips Co., Inc., New York, as technical-commercial man on high frequency heating. Mr. Porter has been with Westinghouse for the past eight years where he did considerable development work in the electronic field.

• **Leroy Camel** has been made sales manager of the Alkali Division, Detrex Corp., Detroit. The promotions of **Joel Cooper,** Detroit, and **Herman Grosser,** Cleveland, as division managers in their respective territories were also announced.

• **Albert R. Fairchild** has joined the Troy Heat Treating Co., Troy, N. Y., as metallurgist. He was formerly with the New York Shipbuilding Corp.

• **Carl I. Collins** has been elected executive vice-president and director of Superior Steel Corp., Pittsburgh. Mr. Collins has been executive vice-president of the Wickwire Spencer Steel Co., in New York, since 1942. Prior to that time, he was manager of operations of the Worcester district of American Steel & Wire Co.

CARL L. COLLINS, executive vice-president and director, Superior Steel Corp.

G. N. HERMAN, president, Continental Foundry & Machine Co.

• **G. N. Herman,** who has been vice-president of the Continental Foundry & Machine Co., Pittsburgh, since 1934, was elected president to succeed **J. T. Osler,** formerly president and chairman of the board. Mr. Osler remains chairman of the board and chief executive officer. **M. G. Sternberg,** who has been vice-president in charge of operations since 1940, was elected executive vice-president of the company.

• **John M. McKibbin** has been appointed assistant to the vice-president, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Formerly manager of the company's application data and training department, Mr. McKibbin's new responsibility will include all product and industry advertising, in addition to his present duties. **L. Gale Huggins** has been named assistant manager of air conditioning; **Walter C. Goodwin** becomes negotiation manager with responsibility for application engineering and negotiations, and **Howard A. Blair** has been appointed service manager.

• **John E. Rovensky** has been elected a director and member of the executive committee of the Brill Corp. and American Car & Foundry Motors Co., New York, to fill existing vacancies.

• **G. L. Revell** has been appointed district manager of the Portland, Ore., office of the Lincoln Electric Co., Cleveland. Mr. Revell, who has been with the company for the past eight years is transferring from the Los Angeles and San Francisco offices.

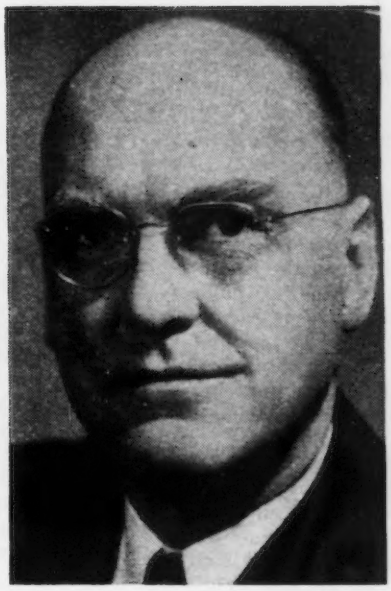
• **Stanley W. Ostrander** has been appointed general manufacturing manager of all plants of the Pontiac Motor Division of General Motors Corp. He has been with Pontiac for the past 11 years.

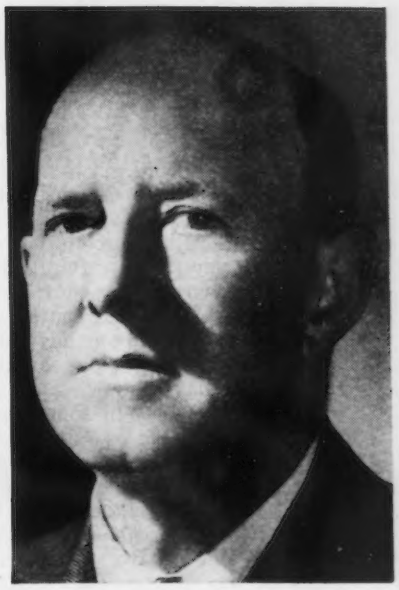
• **Thomas J. Kehane** has been appointed commercial vice-president in charge of the Pacific Coast activities of Worthington Pump and Machinery Corp., making his headquarters in San Francisco. He, likewise, will supervise the corporation's business in the territory served by its Salt Lake City district office. Mr. Kehane has been with Worthington 29 years.

• **R. C. Brannan** has been made manager of the transformer equipments section of the Transformer Division at Sharon, Pa., of Westinghouse Electric & Mfg. Co. Prior to his present appointment he was a headquarters commercial engineer in the Transformer Division of Westinghouse.

• **H. L. Robinson** has been appointed manager of the new Pittsburgh plant of Joseph T. Ryerson & Sons, Inc., Chicago. He started with the Ryerson organization in 1923 in the Plant Engineering Department, later transferring to the Machinery Division, and then to the general Sales Department.

H. L. ROBINSON, manager of the Pittsburgh plant, Joseph T. Ryerson & Son, Inc.





STANLEY B. KIRK, ARTHUR V. WILKER, and FRANCIS P. GORMELY, left to right, presidents of subsidiaries of Union Carbide & Carbon Corp.

• **H. A. Burkett** has been appointed district appliance manager and **J. C. Berner** district sales manager with headquarters at Milwaukee for the Westinghouse Electric Supply Co., New York. **H. E. Toll**, former assistant sales manager at Milwaukee, has been made branch manager at Madison, Wis.

• **Lee T. Bordner**, former sales manager for Eclipse Moulded Products Co., Milwaukee, has been elected vice-president of the Electro-Forming Co., Hartland, Wis.

• **James H. Perry** has been appointed technical engineer in the pulpstone division by Norton Co., Worcester.

• **Julian F. Gordon**, formerly assistant to the manager of the Stainless Steel Division, has been appointed assistant manager of sales for that division of Carnegie-Illinois Steel Corp., Pittsburgh. In the past, Mr. Gordon had been connected with the American Iron and Steel Institute and Republic Steel Corp.

• **Frank J. White**, formerly assistant district manager, has been appointed district sales manager of the Weirton Steel Co. Detroit office. He succeeds L. P. Lane, former Detroit district manager, who died recently. Mr. White who has been with Weirton for over 30 years, has been connected with the Detroit office for the past 20 years.

• **W. O. Aldrich** and **R. T. Carroll** have been made district managers of the Hartford, Conn., and Newark, N. J., offices, respectively, of the Cleveland Automatic Machine Co.

• **Stanley B. Kirk** has been elected president of The Linde Air Products Co., The Prest-O-Lite Co., Inc., Dominion Oxygen Co., Ltd., and Prest-O-Lite Co. of Canada, Ltd., subsidiaries of the Union Carbide & Carbon Corp., New York. Election of the following presidents of other subsidiary companies has also been announced: **Arthur V. Wilker** president of National Carbon Co., Inc., and Canadian National Carbon Co., Ltd.; **Francis P. Gormely** president of Electro Metallurgical Co., Electro Metallurgical Co. of Canada, Ltd., Haynes Stellite Co., Michigan Northern Power Co., and Union Carbide Co., of Canada, Ltd.; **Dr. Joseph G. Davidson** president of Carbide & Carbon Chemicals Corp., and Carbide & Carbon Chemicals, Ltd.; **James W. McLaughlin** is the new president of the Bakelite Corp.; **John D. Swain** president of Electro Metallurgical Sales Corp.; and **John R. Van Fleet**, president of U. S. Vanadium Corp.

• **Roy L. Salter** has been made chief operating officer of the Southern Wheel Division, American Brake Shoe Co., New York, with title of works manager. **W. C. Appleby**, former operating manager, was appointed assistant to the division president, and **D. E. Hensley** was made assistant works manager. **Robert H. Ramage** has been appointed advertising manager for the company's headquarters division in New York.

• **Dr. Eugene McCauliff** has been appointed technical sales director of the Glyco Products Co., Inc., Brooklyn.

• **W. J. Mohr** has joined American Brake Shoe Co.'s export division as a foreign representative. Mr. Mohr was formerly with Lincoln Electric Co. and Armco International Co. He will make his headquarters in Central America.

• **Paul A. Tilley** has been appointed manager of the appliance distributing branches of the General Electric Co., with headquarters in Bridgeport, Conn. Mr. Tilley has been with General Electric since 1927.

• **Henry D. Engelsman**, has been made sales manager and technical service supervisor of Metallizing Co. of America, Chicago.

• **Paul H. Mielke** has been appointed sales and service representative of the Shenango-Penn Mold Co., Dover, Ohio, for its Pittsburgh territory.

OBITUARY...

• **George T. Prosser**, purchasing agent, Century Electric Co., St. Louis, died May 12.

• **Harvey B. Bower**, 51, vice-president of Chicago Latrobe Twist Drill Works, died recently after a brief illness. He had been associated with the company since 1937.

• **Albert Haberer**, assistant chief engineer of the General Motors Fisher Body Division, died at Detroit May 14.

• **Mrs. Mary G. Lodge**, former president of Lord & Shipley Machine Tool Co., Cincinnati, died May 22.

Fatigue Cracks . .

BY A. H. DIX

Truth Addicts All

• • • You are guarded by the ever-vigilant Federal Trade Commission against over-exuberant claims in advertising. The Commission even censors occasional copies of your favorite family journal, to make certain that those who court your favor through our pages continue to worship at truth's shrine.

While our faith in our advertisers' integrity is boundless, we confess that our breath is measurably bated for the few days following the dispatch of a test copy to Washington. "Will something be found this time?" we ask ourselves fearfully, but so far needlessly.

You are therefore warranted in accepting everything in these pages as gospel, for our advertisers practice what Irvin Cobb declared to be the first requirement of good advertising—*honest sincerity.* As a prime example of this quality we offer an advertisement sent to us by our friend, Bill (Armco) McFee, and originally discovered by the late humorist in the personal column of an Australian newspaper:

> If James Mahaffey, who, eighteen years ago, cruelly and wilfully abandoned his destitute wife and infant son, Michael, will return home, Michael will take pleasure in knocking hell out of him.

Stopper

• • • *This* is the end that ought to get the champagne —*Federated Metals Division, American Smelting and Refining Co.*

Pleasant Injury

> . . . Undersecretary of War Patterson said ". . . mobilization for war has not only injured small business, but has strengthened its stability and profits."
>
> —*Page* 106, THE IRON AGE, *May* 4

Once again, please, and this time in our good ear.

"Dezincified on a Cross of . . ."

> In one of your recent issues a valve stem is mentioned as being **dezincified.** This opens a dazzling prospect. I now learn that in the last war I was not **deloused** but **delousified.** Last week my wife mislaid our A book, temporarily degasifying our car.
>
> —*Deao*

Dezinced is clearer and simpler, but lacks oratorical wallop. A Gerald L. K. Smith or a Senator Rankin could do things with *dezincified.* The alternate accented syllables lend themselves to the thunderous tones that seem to come right up from the instep.

But as oratory at technical meetings is as little prized as borscht is in Dublin we vote for the short form.

Bouquet for Selma

• • • What do returned soldiers think about job preference for veterans, about job protection, the closed shop, government operation of government-owned plants? Do they think war workers are being overpaid?

You know the answers if you read pages 87-90 of last week's issue, containing the results of a field survey made by Selma Helen Barmasel, one of this journal's associate editors. Miss Barmasel is the ideal researcher, being pleasant, patient, persistent, and personable. But most important of all, she began her investigation with no preconceived convictions.

Her report is an unbiased, unretouched X-ray of the returned soldier's mind, and we herewith award the brains department an "E" for enterprise in contributing solid fact to an important subject on which up to now there has been little but conjecture.

Postwar Rail Paradise

• • • When the only uniform in a day coach is that worn by the conductor we suppose the railroads will again be looking around for ways of encouraging people to buy tickets. We know of a way: take the names off the stations and put them on signboards about 100 ft. from the rails.

One of the joys of traveling is knowing where you are, and if our brainchild is adopted the traveler will no longer have to press his nose against the window and sprain his neck trying to read the name in the split second it is visible as the train flies by the station.

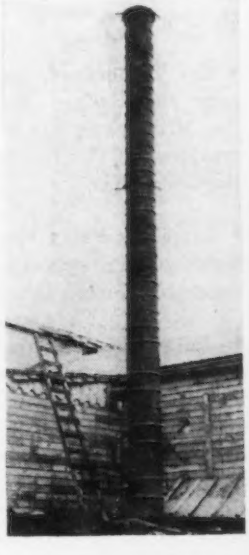
Nine times out of ten he misses, so he tries the store signs, looking for one incorporating the name of the town, as for instance, "James J. Hennessy, Pleasant Center's Leading Embalmer." But the odds against this are high, resulting in successive layers of frustration which amalgamate into a thick plate of resentment against rail travel.

Any highway marking expert could cure this. He would go 'way beyond merely marking stations adequately. He would erect signs reading "One mile ahead is the famous Lover's Leap Canyon," or "Five miles south of here Pocahontas saved Captain Smith's life," or "The Lizzie Borden axe murders took place here." The possibilities are limitless. The signs, of course, should not be so large as to obscure the scenes themselves, except by intent, as in passing a dreary vista like Pleasant Center.

We are reasonably confident that if the railroads did the job thoroughly they could whip postwar rail travel up to a passably frantic pace.

Curtailed Stack

> **According to the caption over the photograph on page 136 of your May 18 issue, Navy experts welded 36 oil drums together to make this 160-ft. stack at a base in the Aleutians.**
>
> **It doesn't look that high to me.**
>
> —*H. F. Cotter*



And it isn't that high. We count only 12 drums, not 36, and as each is about 4½ ft. high, the stack measures in the neighborhood of 53 ft. An "F" in arithmetic to the concern that sold us the photograph.

In a postscript Mr. Cotter graciously provides us with an out which we gratefully accept. If the base is 107 ft. above sea level the top will be 160 ft. high.

Two Heads, Two Tails

• • • We have always been fascinated by names and sentences that are the same fore and aft, like Sherlock Holmes' hat, as, for example, the remark Napoleon would have made had he thought of it and had he been able to speak English—"Able was I ere I saw Elba."

It came to our mind when we were looking over the Chicago subscribers' cards the other day and came across one for a plating shop run by Ronnoc H. Connor.

Puzzles

Last week's Greek died at 84.

Martin Wm. Offinger, of the Westinghouse plant in Bloomfield, N. J, says 4½ minutes is average time for this one:

Two poles standing upright 26 ft. apart are connected by two straight wires, which extend from the top of each pole to the base of the other. If one pole is 40 ft. high and the other 60 ft., how high above the ground (which is level) is the intersection of the wires?

PHOTO COURTESY U. S. ARMY SIGNAL CORPS

THE OLD "75"
Won the first World War
BUT WASN'T GOOD ENOUGH
FOR THE SECOND

Cranes too, Become Obsolete

The French "75" of World War I, was a decisive weapon—so much better than the enemy's guns. It is given a large share of credit for winning that war. It is still a serviceable gun, but not good enough for World War II—ordnance design has progressed, rendered it obsolete.

Crane design progresses too. Those old veterans you have in your shop may be perfectly sound—almost as good as when you bought them. But they are too slow and unwieldy for the battle of modern production.

Increase plant production—reduce handling costs—*conserve manpower* by replacing these old cranes with new Northern Cranes.

Northern Cranes are faster, more powerful, stronger—require much less attention.

Combination of speed, great overload capacity and fine control increases production of your whole plant—quickly pays the cost of new Northern Crane equipment.

We've been building superior cranes for more than 40 years, and can meet *your* needs. Write for details.

NORTHERN ENGINEERING WORKS

General Offices: 2607 Atwater St., Detroit 7, Mich.

NORTHERN CRANE & HOIST WORKS LIMITED, WINDSOR, CANADA • OFFICES IN PRINCIPAL CITIES

Dear Editor:

WHIM, WHAM

Sir:

Will you be kind enough to send me four copies of the superb editorial, "Rule by Whim and Wham," written by J. H. Van Deventer and appearing in your May 11 issue?

ERWIN MARX

G A. Gray Co.,
3611 Woodburn Ave.,
Cincinnati, Ohio

Sir:

We have read with considerable pleasure your May 11 editorial, "Rule by Whim and Wham." It certainly hit the nail on the head.

D. B. HIGBY,
Treasurer

Champion DeArment Tool Co.,
Meadville, Pa.

MACHINE TOOL STANDARDS

Sir:

In your May 4 issue you have an article concerning the meeting on General Motors standardization of machine tools. Could I get a more detailed copy of the suggestions?

M. D. POLLOCK,
Plant Electrical Engr.

Steel & Tubes Division,
Republic Steel Corp.,
72 Scott Ave.,
Brooklyn, N. Y.

● Write to H. T. Johnson, Director of Standards, General Motors Corp., Detroit. —Ed.

AVERAGE STEEL PRICE

Sir:

In charting steel prices for 1929 to date we used your weighted index. . . We had assumed that as the prices of steels had not changed since 1940 the weighted average would not fluctuate. But we notice that your average price in the first half of 1943 is higher than the latter half of 1943 and first half of 1944. Will you kindly explain?

DIXON BOARDMAN

Bank of America,
Los Angeles 54

● As ours is a weighted average, it reflects changes in the relative tonnages of bars, sheets, beams and the other components of the index. Each year, when the official production figures are obtainable, the index is refigured, but the weekly figure is altered only when prices change.—Ed.

BONDERIZING

Sir:

I expect to go into the Bonderizing business in the near future and would appreciate any information you may furnish.

C. B. RUNKLE

254 Barclay Ave.,
Millbrae, Cal.

● Bonderizing is a patented process controlled by the Parker Rust Proof Co., 2177 E. Milwaukee Ave., Detroit, which will furnish full information.—Ed.

PARKERIZING

Sir:

We would like to obtain the necessary equipment for oxidizing or Parkerizing malleable iron.

WILLIAM E. BOETTNER

Machined Metals Co.,
220 Ford St.,
West Conshohocken, Pa.

● We suggest you communicate with the Parker Rust Proof Co., 2177 E. Milwaukee Ave., Detroit.—Ed.

COLD BLAST IRON

Sir:

I have read Ralph H. Sweetser's comment on your Mar. 16 "Dear Editor" page, regarding my article in your Feb. 17 issue, "Cold Blast Irons Duplicated by Synthetic Mixtures."

The specimen of cold blast pig iron used in the investigation was taken from a consignment of a well-known make of British cold blast pig iron. I am unable to say what fuels were used in the particular blast furnace in which this iron was produced. I am able to say that as a cold blast iron it was claimed to possess "it," using "it" in the sense it is used in Mr. Sweetser's article, "Charcoal Pig Iron," in your July 1, 1943, issue.

This claim, so far as my determination of the mechanical properties is concerned, was justified. My investigation shows that these properties can be duplicated by a synthetic mixture and I am able to say that all the irons used in my synthetic mixture were hot blast irons made in furnaces using coke as fuel.

I should like to call attention to a slight error in my article in your Feb. 17 issue. On page 76, middle column, the opening sentence of the last paragraph should read, "The chemical analysis of the *UN*-successful match. . . . is given in Table IV" and the heading for Table IV should refer to column 2 NOT 3 of Table II.

J. E. HURST,
Technical Director

Bradley & Foster, Ltd.,
P. O. Box No. 4,
Wednesbury, Staffs, Eng.

NE STEEL CHART

Sir:

We have for reference a large tabulation of NE Steels issued by you on May 6, 1943. We find this chart very useful and are wondering whether or not a later edition has been published.

GLEN J. SCHOESSOW

Babcock & Wilcox Co.,
Barberton, Ohio

● Nothing later.—Ed.

SURFACE MEASURER

Sir:

In the article, "Diamond Turning to Micro-Inch Finish," in your Apr. 6 issue reference is made to an instrument made by Taylor, Taylor & Hobson, Ltd., called the "Talysurf," which is described as being similar to the Brush surface analyzer.

Could you give us the name of their representative in this country?

R. C. MURRAY,
Engineering Department

Vendo Co.,
Aircraft Products Division,
2500 Washington St.,
Kansas City 8, Mo.

● As far as we know Taylor, Taylor & Hobson, Ltd., Leicester, England, has no American representative.—Ed.

STRESS TERMINATION

Sir:

Sometime ago you had an article describing the use of clear lacquer for determining stress concentration by a visual method. Can you tell us where such a lacquer may be purchased?

O. KRAUSS

Gale Products,
Galesburg, Ill.

● The lacquer is called Stresscoat and is supplied by the Magnaflux Corp., 6000 Northwest Highway, Chicago.—Ed.

POSTWAR STEEL SITUATION

Sir:

I have in the process of preparation a memorandum on the steel industry's postwar outlook which will make the following pertinent observations:

1. A high level of industrial production generally must spell a high level of demand for steel.

2. Competition from the lighter metals and plastics will be much smaller than is popularly believed.

3. The threat of excess capacity is more apparent than real; obsolescence plus the plants which will be scrapped may keep competitive capacity around 75 million tons.

4. In a normal economy, the industry could make as much money (before taxes) operating at 80 per cent of capacity as it is running at 100 per cent capacity.

5. The threat of government owned facilities is comparatively small.

Could you, without too much trouble, tell me whether or not these optimistic conclusions make sense to you?

S. B. LURIE

Paine, Webber, Jackson & Curtis,
25 Broad St.,
New York City

● These five observations are pretty much in line with our beliefs. A high level of industrial production means an active steel demand. We believe that postwar competition from plastics will be negligible. As to what inroads the light metals will make on steel, the picture is still not too well defined but indications are the effect will be relatively slight. As to excess capacity, there is some obsolescence, just how much the producers will scrap is problematical. We doubt, however, that the capacity figure will drop as low as 75 million tons. It will probably be 80 million or higher. With regard to money to be made at various rates of capacity, this is too nebulous for us to touch upon, as a normal economy would have to be defined. We see no threat in government owned facilities, for the reason that the government would have little justification or desire to operate steel mills. —Ed.

Quick conversion

from War to Peace with the Monarch Magnamatic

Monarch Magnamatics will save many man-hours and machine-hours for war work, and then can quickly be converted to peacetime production without retooling.

Magnamatics are the most universal automatic lathes ever built. They will do a wide variety of turning, boring, facing or chucking work, with any number of diameters and lengths and with intervening contours or tapers. A reasonable number of tools in the rear carriage slide can be used for facing, necking, forming or chamfering. Single point tools are guided by gage blocks, micrometer heads or metal templates, depending upon the work.

Because the average set-up time is from 5 to 15 minutes, Magnamatics are economical for short runs. Yet, completely automatic operation enables fast, accurate production of large quantities at very low cost. On most jobs, one operator can tend two or more machines.

The value of Magnamatics was widely proved before the War, but production was stopped to meet greatly expanded demand for standard and toolmaker's lathes. Reasonably short deliveries can now be made. Our engineers will gladly help you utilize Magnamatics for present war work and later for peacetime products.

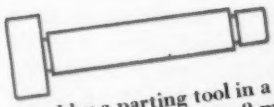
THE MONARCH MACHINE TOOL COMPANY · SIDNEY, OHIO

Direct factory branches at Chicago · Cleveland · Detroit
Newark · Pittsburgh · Representatives in principal cities.

Typical Magnamatic Jobs

Step shaft turned on a Magnamatic equipped with automatic feed changes for the three diameters of .025", .040" and .050" respectively. This feature saves valuable time on work like this.

• • •

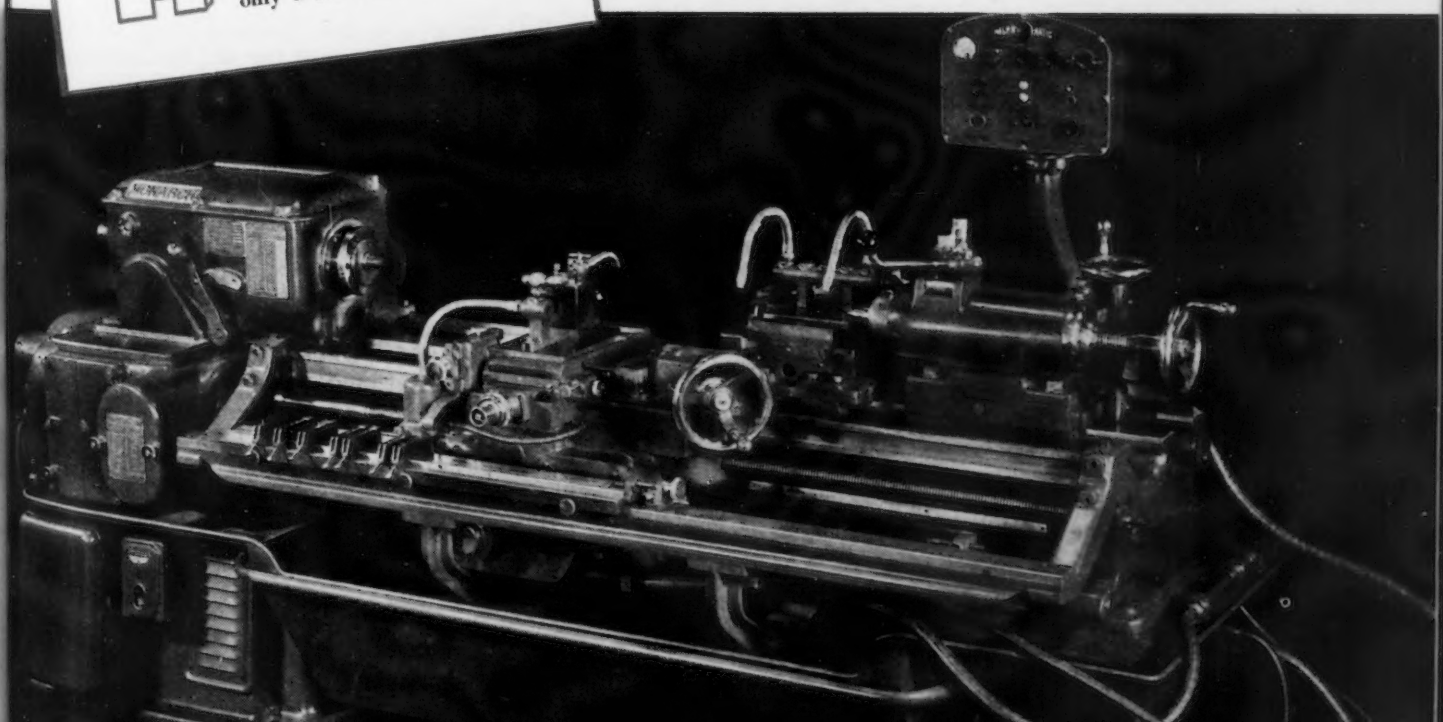


On this job, two pieces are turned from each bar and separated by a parting tool in a separate operation. Total set-up time 8 minutes. Production, 45 complete pieces per hour.

• • •

Combination of chucking and step shaft turning on a Magnamatic equipped with air chuck and boring bar holder. Set-up to change from work between centers to that for automatic chucking takes only a few minutes.

MONARCH LATHES
Save Time



This Industrial Week . . .

- **No Down Trend in Steel Buying Seen**
- **Flat Rolled Items Continued Tightest on Deliveries**
- **Steel Rate Up One and a Half Points to 99 Per Cent**

AGGREGATE steel sales volume in the past week was strong enough to substantiate the belief that the recent hesitancy in steel purchases was by no means indicative of a lower trend in buying. Orders were more brisk on many items in the past week and there were additional signs that the flat rolled situation will not change much in the third quarter even though some easing had been expected earlier in the year. Increased demands for urgent war sheets and the failure of plate demand to subside to any great extent has in some measure made it necessary for the War Production Board to have plate producers accept more than 110 per cent of their production quota beginning in July.

It is expected that due to the heavy pressure for many types of steel products, it will be necessary for WPB to overallot on steel products other than plates. This ordinarily would force a larger carry over if the steel industry should run into production difficulties as it may in the third quarter. Washington officials, however, hope that the over-allotment situation will be clarified by cancellations or military cutbacks before conditions become serious productionwise. It seems certain in the trade, however, that less essential steel orders will soon be in for further "pushing around."

One thing seems certain this week and that is that more steel sales and production officials do not believe the third and fourth quarter total steel requirement picture has crystallized to an extent where definite conclusions can be drawn. The state of mind this past week is strongly reminiscent of the confusion which existed in the middle of 1943 when total requirements appeared to be much greater than the supply. The major difference between last year's hectic period and the one which the steel industry is now entering is great enough to indicate a little more difficulty in meeting the huge military and essential civilian needs.

Steel production officials are fearful that the long and continuous grind on men and machinery will further reduce the efficiency of the steel output. In some plants a marked drop in efficiency per man has been noted because of green help as well as fatigue and absenteeism. Factors such as these, while apparent last year, are much more accentuated now. While it may be stretching the imagination slightly, there are some steel observers who believe that the long drawn out steel wage hearings are also having their effect on steel production even though this effect might be small.

STEEL products which were in the tightest delivery position last week included sheets, plates, large size bars, and semi-finished steel. The tightness is one of specific products rather than general overall steel items. Cold finished bars, which were said to have a backlog of nine months recently, are now hardly more than three months in the unfilled order category. Structural steels are not in heavy demand, although it is doubtful whether they could be supplied if the demand should pick up to any great extent because of the impact of the shell steel program. Small hot rolled bars deliveries are easy on some mills, welded pipe is fairly easy, but electric welded pipe continues to have its deliveries advanced, due to the shifting of some seamless orders to electric weld mills.

One factor which has contributed to the strong steel production tempo is the lessening in the number of cancellations recently. Some companies have noted that their total cancellations in the past few weeks have been at the lowest point for several months. This is in direct contrast to a few months ago when cancellations, due to cutbacks and change in programs, were quite heavy. If and when invasion begins and appears to be successful, the steel industry may well be flooded with certain military cancellations and cutbacks which would immediately ease up the steel picture. It is believed that the heavy volume of steel for military purchases has been placed on the basis of assuring no chance of military failures with respect to the supplying of actual equipment and ammunition. Such cutbacks, if they came however, would probably follow a rather definite time lapse and it is for that reason that steel officials look for new levels in production during the third quarter.

OFFICIAL figures on the Iron and Steel Division of the WPB in support of the WPB's contention that CMP is not breaking down reveal a slight improvement in the first quarter on the percentage of shipments to orders accepted when compared with the third quarter of 1943. In the third quarter of 1943, the per cent of shipments to accepted orders was 99.74 per cent, but in the first quarter, 1944, it was 100.57 per cent. Despite the reassurance from Washington that over-allotments will not endanger CMP deliveries and the system itself, such reassurances have been received by some steel people as an excellent goal for which to strive.

This week's national steel operating rate climbed one and a half points to 99.0 per cent of rated capacity. Only two districts contributed to the rise in national output, Youngstown, which gained 17 points to 113.5 per cent, and Cleveland, up half a point to 98.5 per cent. Declines occurred in Chicago, down half a point to 100.5; Wheeling, also down half a point to 98 and in the eastern district, down one point to 106.5 per cent. Unchanged from last week was Pittsburgh at 95; Philadelphia at 99.5; Buffalo at 104.5; Birmingham at 97; Cincinnati at 92 and St. Louis at 74.

• **NEW NE STEELS**—National Emergency (NE) Steel compositions have been widened liberally with the establishment of three new series and the reinstatement of one enlarged series, according to the American Iron and Steel Institute. Representatives of Army Ordnance, the WPB, steel producers and consumers collaborated in making the changes. The changes, effective for June melting, will add to the usefulness of the NE Steels and permit greater consumption of triple-alloy scrap which has been accumulating. The new series are the 9700, 9800 and 9900 groups, all containing small quantities of chromium, nickel and molybdenum in various proportions. The series restored and enlarged is the 8700 group, curtailed last autumn because of a temporary shortage of molybdenum.

• **STEEL AND INVASION**—Steel makers are mindful of the fact that the tightness in steel with all indications pointing to a record breaking third quarter are predicated on pointing up to and supporting the invasion drive. Until the time comes when the actual invasion is made and until the time when it is crystal clear that it will be successful it seems certain that steel needs will be great and military requirements will get the right of way. That is why the WPB has warned that it will make sure of a balance between shipments and orders even if it becomes necessary to cut back on less essential steel items. That this will be necessary seems to be a foregone conclusion this week.

• **ARMOR PLANT SHUTDOWN**—The $26 million cast armor plant of the American Steel Foundries Co. at East Chicago is to go down as soon as current runs are completed. Production has been curtailed for several months as result of bobtailing the tank program, for which the plant was built. The plant, according to Ordnance officials will be put in a standby condition. The company said 1600 employees will be laid off. The CIO-USWA are protesting the contemplated layoff and asking that the plant be kept in operation. This action of the union may be a forerunner of its strategic policy with respect to other war plants which may have to be shut down. Such an action will add to the already "jittery" feeling among the rank and file steel workers.

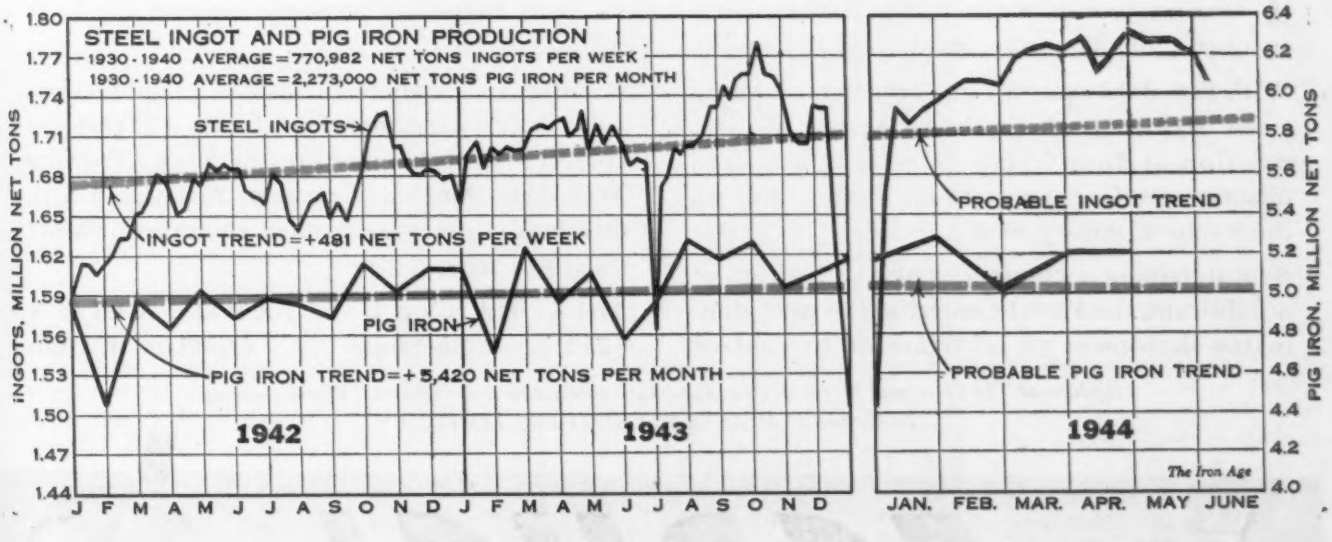
• **WEST COAST IRON**—Despite the new blast furnaces added to the West Coast in the past few years indications are that iron will be on the short side for awhile. All stacks in operation are needed to assure the production of ingots for steel plate and shell. It is said that iron may even be hauled from Birmingham to the West Coast if necessary. A Geneva Steel Co. furnace was slated to be blown in in March but is not in yet. Even when blown in, raw material and labor shortages may be deterrent to full output.

• **STRUCTURAL BOOKINGS UP**—According to the American Institute of Steel Construction, April bookings of fabricated structural steel for bridge and building construction was at the highest rate since June, 1943. The orders amounted to 62,073 tons. Contracts placed during the first four months of this year amounted to 172,094 tons and shipments in those same months were reported as 152,717 tons.

• **AIRCRAFT ENGINE**—The most powerful aircraft engine yet announced is in production by the Allison Division of General Motors. Turning up 3000 hp., the engine is in effect a "W" type, consisting of two "V" arrangements. This provides four rows of six cylinders each, and weight is reported less than 1 lb. per hp. The new engines, designated as the V-3420 series, are going into fighter ships still on the secret list.

• **MAGNESIUM FIGURES**—For the year 1943, rated annual capacity of all magnesium metal plants in this country was 290,000 net tons of which 44 per cent belonged to the Dow group, producers of 60 per cent of all magnesium made. During the year, Dow owned or managed plants produced at 87 per cent of rated capacity while all others averaged only 46 per cent. Dow received 38 per cent of all government money spent on the magnesium program and has returned 1.2 lb. of magnesium per government dollar invested. For every pound produced by others, the government has an investment of $1.67 and receives 0.6 lb. for each dollar.

The Iron Age

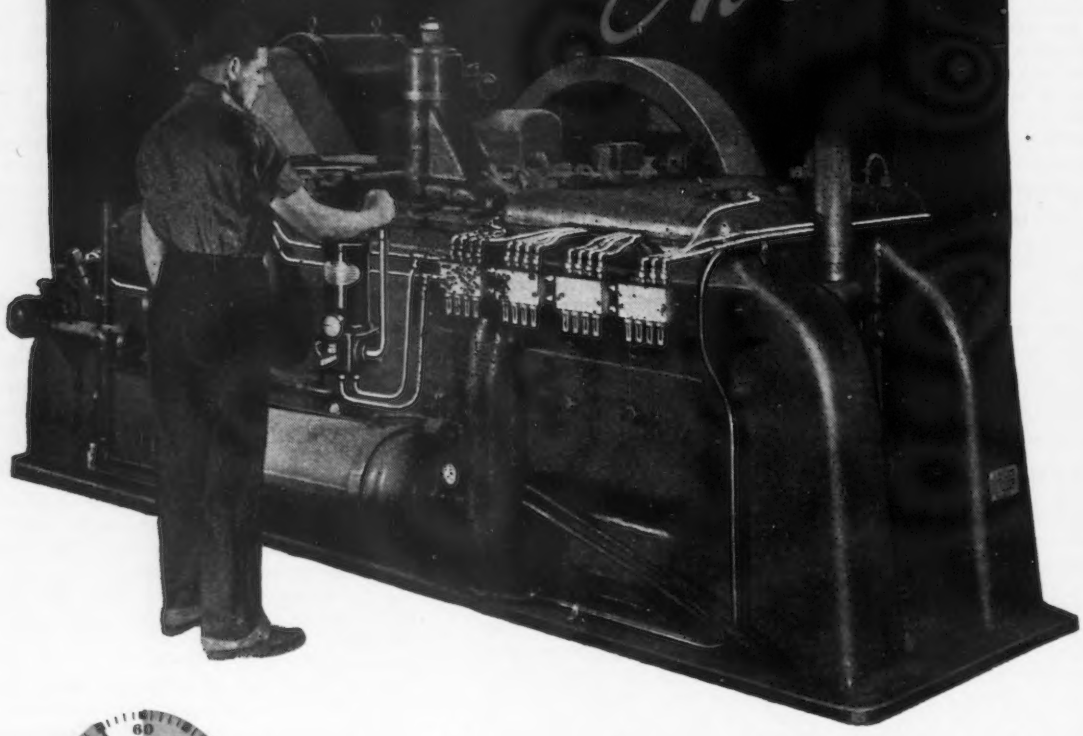


Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
May 25	95.0	101.5	96.0	99.5	98.0	104.5	93.5	97.0	100.5*	92.0	92.0	74.0	107.5	97.5
June 1	95.0	100.5	113.5	99.5	98.5	104.5	98.0	97.0	101.0	92.0	92.0	74.0	106.5	99.0

* Revised

HOW TO LUBRICATE ALL OF YOUR BEARINGS *At Once*



in less than 1 minute!

INSTEAD of taking one minute for **each** bearing, your oiler can lubricate **all** bearings in a *half* a minute—from one safe, central point.

With Farval the operator gives the Central Pump a few strokes and—without leaving his safe position at floor level—delivers a measured quantity of oil or grease to all the bearings on the machine, *missing none.*

By maintaining a continuous film without waste of lubricant, the Farval Centralized System eliminates shutdowns to lubricate or to replace bearings—reduces power consumption by as much as 20%—and prolongs bearing life from 5 to 25 times.

Positive lubrication by Farval is helping to reduce costs in every industry. Farval men will plan the correct Systems for *your* Presses, Shears, Forging Machines, Punches, Crushers, Machine Tools, Overhead Cranes and other equipment. Write today—or *wire.*

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Labor Relations Board Places Itself In a Peculiar Position On Foremen's Organizing Drive

By STANLEY H. BRAMS
Detroit Regional Editor

o o o

Detroit

• • • **War Labor Board hearings** begin shortly in Detroit in an effort to find a way for WLB and the National Labor Relations Board to get off the barbed wire foremen's bargaining fence on which they have impaled themselves. The hearings will encompass the entire history of supervisory bargaining, with briefs from the Foremen's Association of America and other unions, and from management sources. The hearings may continue several weeks.

The NLRB, by general interpretation, has placed itself and the foremen in one of the most peculiar positions yet developed in collective bargaining arrangements of recent years. A pronouncement, in effect, gave the foremen the protection of the board against any discriminatory moves by management as a result of organizing activity, and protected them also against unfair labor practices. The foremen were given an implied right to organize, and management was forbidden to interfere with such organizing. But—and here is where the NLRB climbed its thorny fence—the ruling went on to maintain that managements were under no compulsion to bargain with any such group once it was organized.

This half-loaf was less than entirely pleasing to FAA members, but they are back at work in Detroit anyway after a militant three week strike early in May. They give plain indication, however, that the half-loaf is not satisfactory and that they want more. They indicate that only extreme pressure from the services, symbolized by the much publicized denunciation of Gen. H. H. Arnold, broke up their strike.

In other labor circles in Detroit, and in management circles as well, the organizing of foremen presents the most difficult problem yet faced in recent labor years. The supervisors are considered by management as part of management, whose organization would leave the front offices without unprejudiced representation in the shops. The foremen, however, dispute this viewpoint. They say they are merely "transmission belts" for management policies, shorn today of the managerial prerogatives of hiring, firing and disciplining. But management feels that someone must be at the end of its authority line; that if the foremen are organized and become labor, as differentiated from management, then the superintendents will become the "last stop." But then, why might not the superintendents organize? Then the managers, then the presidents?

The FAA was born at the Ford Motor Co., in November, 1941, grew steadily, and had its first formal dispute when a foreman was discharged the following May. Negotiations ensued, the effect of which was to give recognition to the FAA as a bargaining agency. In November, 1942, an agreement on wages and foremen's classifications was set up between Ford and FAA.

During this period of growth at Ford, supervisors of other Detroit companies joined up. Organizations progressed at Chrysler. Briggs plants began to be drawn in. A few out of town company supervisors set up chapters. Murray was organized.

The first major stumbling block rose up during organization work at the Detroit Diesel Division of General Motors. G.M., sensing an acute threat to its management framework, hastened to Washington and asked Congress to legislate clearly that foremen could not constitute an eligible bargaining group under the Wagner Act.

But the NLRB took a hand which made such action unnecessary at that time. In May, 1943, it ruled in the Maryland Drydock Co. case that the Wagner Act did not apply to such management representatives as foremen.

The FAA sputtered for a time, then quieted down. Last January it broke briefly into the news with a week long strike in eight Chrysler plants, ended by a request from the National War Labor Board to return to work. The FAA returned, claiming that the request was tantamount to recognition.

But there was no Washington follow-up. The foremen found some grievances at Briggs, and went out last month. Other FAA strikes followed in rapid fire order at Hudson, Murray, Packard,

NEWS OF INDUSTRY

AFTER TESTIFYING: *Gen. Henry H. Arnold, chief of the Army Air Forces, shakes hands with William H. Davis, chairman, WLB, after testifying on the Detroit foreman's strike on May 17th.*

Gar Wood, and Aeronautical Products. The foremen were showing their strength in an all out fight which ended only under the pressure of the services.

The last has not been heard of them. Everyone admits that. They claim 25,000 members in 156 plants, 100 of them in Detroit. The problem is how to meet them when their recognition struggle resumes.

Ford did it by signing an agreement with them last month, setting up a grievance procedure, providing for a seniority code to be established, incorporating previously reached arrangements on pay and classifications.

Other Detroit companies, however, want no part of any recognition. They are determined to make no concession short of government coercion. But on its own side, the FAA realizes its most potent weapon for government support is a strike during a period when Washington most needs its members at work. As a result, post-invasion walkouts might be expected.

The president of the FAA is young Robert H. Keys, one-time Ford foreman who worked at his plant job for several months after becoming president of the "then-infant" organization. He is bright, personable, determined. He wants no checkoff ("we'll handle our own money collections"), but he'd like a closed shop setup. His ideas are modest—dues in the FAA are $1 per month, five cents of which goes into a "strike and lockout" fund. He works hard. He's not an experienced labor leader—not yet—but he's learning. He definitely prefers to reason and negotiate rather than strike; he maintains with real sincerity that every FAA strike has come as a last ditch measure, following on failure to settle disputes any other way.

He is known to have talked with many other unions about possible affiliation and support. The CIO United Automobile Workers wants no foremen in its organization as long as supervisors' status is in jeopardy in Washington. But once recognition comes to FAA, the CIO might move in to try to gobble up the youngster organization. So might other central unions. This potential united union front is a management hobgoblin.

Withholding active support meanwhile, CIO gives passive help to the FAA. In the Detroit strikes during May workers refused to work under "scab" foremen, and refused to move up to the empty jobs. Detroit management believes CIO is secretly backing the foremen to a major extent. But some Detroit management feels more positively that Ford's Harry Bennett was the original "angel" of the FAA—which goes to show how much odd speculation surrounds every new labor outgrowth in the automobile city.

Management is partly responsible for the growth of the supervisors' union, much of Detroit believes. It made the foreman the "forgotten man" in its administrative setup, holding him responsible for results and stripping him of ways to achieve those results. For a time (this is a dead issue now) it underpaid him in comparison to the overtime wages of workers under his direction. Out of such incubating grounds did the FAA arise. Managements elsewhere might contemplate their positions and see whether their factory soils are equally fertile for the growth of supervisor bargaining units.

Army Shifts from Fiber to Steel Ammunition Containers for Durability

Washington

• • • A War Department announcement stated that it is estimated that the Ordnance Department, Army Service Forces, will require 125,000 tons of steel during the first three months of the new steel ammunition container production program. A shift to steel was made because the previous container, made of fiber and metal, provided inadequate protection.

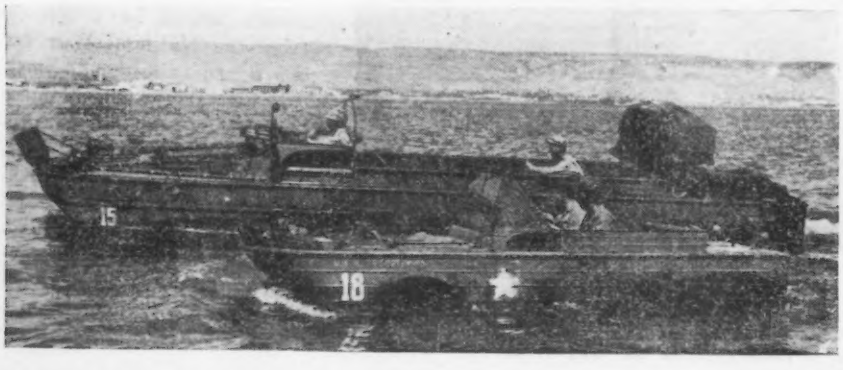
The announcement added: "Although the new container has not been standardized by the Ordnance Department, orders already have been placed for its production. Hot and cold rolled sheet and strip steel are required, with more than one-third the tonnage to be purchased in the form of steel tubing. The tubing required by the Army represents almost the entire heavy welding tube steel capacity of the country.

"No large saving in paper will be effected since containers for packaging rounds of greatest production, like the 60-mm. and 81-mm. mortar, and the 75-mm. and 105-mm. howitzer, will utilize an inner fiber carton.

"Shipping space requirements per unit of ammunition will be greater because the packaged weight of each complete round will be increased in some sizes, but the over-all shipping space requirements will remain the same because of the expected reduction in the unserviceable ammunition delivered.

"Used cartridge cases may be sent back to the United States in the new containers, a factor that is expected to result in their increased return rate."

DUCKS: *An amphibious jeep escorts an amphibious 2½-ton truck offshore in the landing area of the Southwest Pacific. Ducks, such as these shown here, are practically essential to the success of amphibious landings of modern transportation in combat today.*



New Officers Elected to Purchasing Agents Assoc.

Chicago

Henry C. Bauer, Revere Copper & Brass, Inc., has been elected president of the Purchasing Agents Association of Chicago, succeeding Thomas J. Anderson, Acme Steel Co. Other officers are: A. G. Pearson, National Broadcasting Co., vice-president; M. R. DeBaets, Bowman Dairy Co., second vice-president; Harry H. Wise, Scovill Mfg. Co., treasurer, and L. R. Seen, Borg & Beck, secretary.

New Pricing Method Issued For Exporters of Excess Iron and Steel

Washington

• • • **Made necessary** by changes in the domestic iron and steel ceiling provisions, effective June 1, OPA has announced a new pricing method for exporters of iron and steel products classified as "excess stock." Also effective June 1, the new formula made by amendment 6 to the Second Revised Maximum Export Price Regulations provides that exporters instead of taking their suppliers' ceiling price as their base price, they will take the maximum delivered price at the port of exit which a holder might charge a user under the domestic iron and steel regulation. The same additions to the base price are continued to cover export premium and shipping expenses.

Holders who sell excess stock to domestic users now have maximum prices equal to the mill base price to the holder, plus the holder's incoming freight from his nearest basing point, plus the outgoing freight to customer. These also will become the holder's base export prices under the new pricing method.

After June 1 export license applications should have attached to them a price build-up to conform with the new pricing provisions, in order to permit review.

Sales by holders to domestic resellers are exempt from price control where a firm offer at the ceiling price has not been received from user. Exporters may thus be able to buy excess stock at uncontrolled prices. Consequently they cannot use their supplier's ceiling price as a base price but, as the result of the action must use the maximum price the holder could have charged a user at the port of exit. This puts them on the same basis as if they were selling in the domestic market.

Exporters with excess stocks on hand, for which they have already obtained export licenses at prices higher than now permitted, are given until Sept. 1 to make shipment on outstanding contracts at prices no higher than formerly allowed.

500 Car Order for Mt. Vernon

• • • **Pacific Fruit Express** Co. has awarded a contract for 500 refrigerator cars to Mt. Vernon Car Mfg. Co., Mt. Vernon, Ill., a subsidiary of H. K. Porter Co., Inc., Pittsburgh, it was announced May 26.

Huge Supply Stockpile of Materiel Awaits D-Day in England

IN PHOTOGRAPH (*upper left*), *rows of caterpillar tractors and bulldozers are lined up at U. S. Engineers supply depot. Below, a crane lifts one of many rolls of British-made Clinton landing mats. At upper right, American built Higgens boats are anchored off the coast. Below, Yanks unload reels of telephone wire from freight car at supply depot somewhere in England.*

Civilian Steel Consumption Will Not Keep Pace With War Shifts, Says Tower

New York

• • • **It seems unlikely** that steel production in 1944 will go much, if any, above the mark set last year, despite the fact that more steelmaking capacity is available now, according to Walter S. Tower, president, American Iron and Steel Institute, speaking at the 53rd general meeting of the Institute in New York on May 25.

"The present outlook is for decreasing rather than greater overall production for direct war uses," Mr. Tower said, "and it is doubtful whether any probable shift toward larger civilian consumption will keep pace with the speed of war program curtailment."

Because steel production has risen steadily for the past 40 months and only two-thirds of this colossal output has gone directly or indirectly into war uses for ourselves and the Allied nations, war stores have been accumulating for nearly three years and to an extent never before equaled by any nation, he said.

Mr. Tower urged delegates to keep in mind the fact that the cessation of hostilities in the European theater would cut the war burden on industry by 30 or 35 per cent. For the steel industry, the percentage may even be larger, but in any event the fact will mean cancellation of orders for millions of tons of steel. The problem, and possibly grave difficulties, lie in the disposal of such stocks on hand.

In view of the fact that the steel industry does not face a large problem of reconversion of plant facilities to production for purely peacetime uses, problems of reconversion for the steelmaker will center on the inevitable troubles to be faced by his customer. How much steel will they need? How soon can they be ready to fabricate for civilian consumption?

Although postwar demands for steel have been the subject of much speculation, some fantastic estimates running as high as 120 million tons a year, the facts, based on demand in the past, suggest even in good years after the war a maximum range of no more than 65 or 70 million tons a year, according to Mr. Tower.

As this last figure represents only 70 to 75 per cent of present steel output capacity, he said, the status of capacity not needed poses a present problem to the steel industry. As a preliminary solution to the problem, Mr. Tower suggests: 1—Using the excess as produce steel for export. 2—Dismantling such uneconomical or marginal units as have been kept in operation solely to swell wartime tonnages. 3—Treating as standby plants those government financed units which private interests do not wish to acquire.

Mr. Tower touched on the subject of re-employment of returning servicemen and other workers who may have to be released. He believes that although this problem is primarily one for the individual companies concerned, it is important to get the right answer soon to all affected, the employee, the company, and the whole industry.

On the subject of unwinding the "tangled skein" of governmental controls, regulations and restrictions, Mr. Tower anticipates even tougher problems than those created by their original application. He views with some apprehension the question of whether or not these controls will disappear with the war program. Indeed, there are signs that efforts will be made to prolong, if not perpetuate, the varying degrees of controls.

Mr. Tower pointed out, however, that there may be sound economical reasons for a short term continuation of some of these controls, industry should be thinking along the all important line of eventually managing their own affairs.

At the technical session in the afternoon, H. G. Batcheller, president, Allegheny Ludlum Steel Corp., presided. The following papers were read in abstract and discussed:

"Development and Application of Military

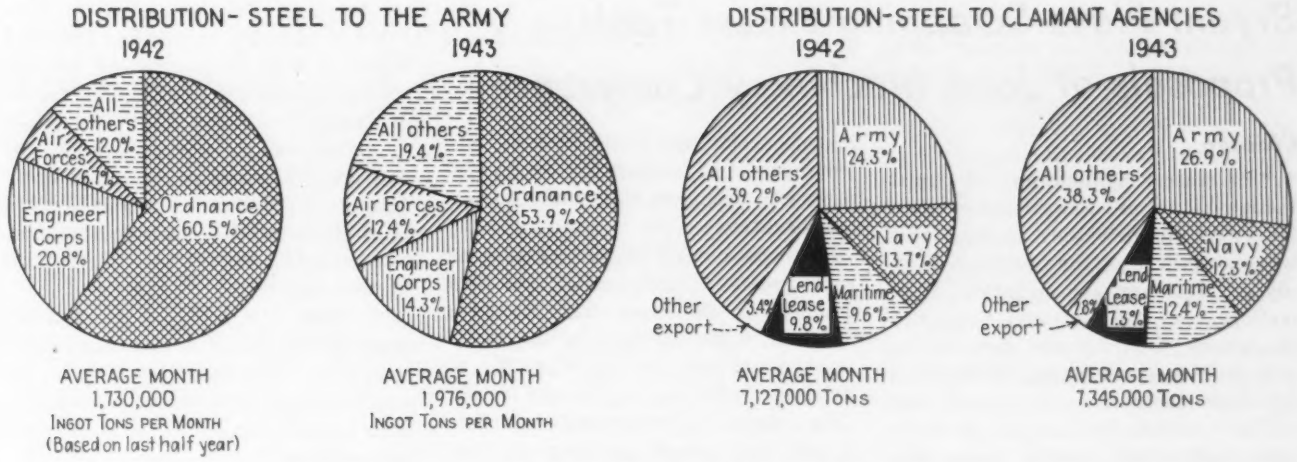
Quincy Bent Gets Gary Medal Award

• • • Quincy Bent, vice-president of Bethlehem Steel Co., Bethlehem, Pa., was awarded the Gary Memorial Medal at the general meeting of American Iron and Steel institute at the Waldorf-Astoria.

The medal was presented to Mr. Bent by Walter S. Tower, president of the Institute, with the citation: "For outstanding leadership in the art of steel production and in contributions to the development of alloy steels to meet the needs of war emergency." The award of the medal to Mr. Bent was the first to be made since 1935.

For a number of years Mr. Bent has been in charge of operations at all Bethlehem plants. As chairman of the institute's Committee on Manufacturing Problems for several years, he has had an active part in conducting the production and technical activities of the institute. He was active in promoting the research leading to the wartime development of the National Emergency alloy steels and in establishing those steels on a large scale production basis.

During the war Mr. Bent has served as chairman of the WPB subcommittee on Steel Plant Expansion, the Metallurgical and Operations Industry Advisory Committee of the WPB Steel Division, and of the Joint Metallurgical Mission of the United Kingdom, Canada and the United States.



Steel Distribution to Claimant Agencies

and Special Steels for Ordnance Purposes," by Col. John H. Frye, technical division, Office of the Chief of Ordnance, War Department.

"Development of Special Steels for Naval Purposes," by Lt. Com. E. G. Touceda, research and standards branch, Bureau of Ships, Navy Department.

"Stresses in Welded Structures," by H. C. Boardman, director of research, Chicago Bridge and Iron Co.

"The Steel Industry's Place in Safety," by W. A. Irvin, chairman, board of trustees, National Safety Council.

"Some Aspects of Commercial Production of Alloy Steels to Hardenability Requirements," by W. G. Bischoff, metallurgical engineer, Timken Steel & Tube Division of Timken Roller Bearing Co.

"Principles Involved in Determining Hardenability Limits for Alloy Steels," by L. L. Ferrall, metallurgical engineer, Rotary Electric Steel Co.

"Electrometallurgical Treatment of Ores," by Charles Hart, president, Delaware River Steel Co.

Army Is Largest Steel Consumer

"WARS are not won with steel ingots; these must be processed into essential items." Colonel John H. Frye, of the office of the chief of ordnance, War Department said before the general meeting of the American Iron and Steel Institute.

Since Dec. 7, 1941, the American steel industry has produced 225,000,000 tons of ingots and castings. Of this total, over 185,000,000 tons were ingots for the manufacture of wrought products.

"Largest single claimant agency for the products of the steel industry," Col. Frye pointed out, "is the Army, having used 26.9 per cent of total steel production in 1943 and 24.3 per cent in 1942. Of this, the Ordnance Department consumes more than half of all steel allocated to the Army, although the average monthly consumption last year was materially reduced (60.5 per cent to 53.9 per cent). The Corps of Engineers also had greatly reduced requirements while the Air Forces had an increased need of nearly double the 1942 tonnage. All others, which includes the Transportation Corps, Signal Corps and other Technical Services used approximately 50 per cent more than in 1942.

"It is generally known," Col. Frye continued, "that during the past year production of many items has been drastically curtailed. Tank production has been materially reduced; some artillery items, particularly anti-aircraft guns, have been virtually eliminated from production; common sizes of high explosive shells have been cut back, and production of armor piercing bullets and shot has been greatly reduced. What is not so generally known is the expansion of certain other items in the program and the introduction of requirements for new types of materiel. Jungle type of warfare created a need for large numbers of mortars, rockets and other types of light but effective artillery and ammunition. Production requirements of these items came in at about the same time that anti aircraft guns and some types of ammunition were being curtailed. Steel requirements for shells and shot were diminished as the spare parts program for tanks increased; armor piercing bullet core production was greatly reduced as new emphasis was being placed on increased carbine production. More recently, the "duck" and heavy truck programs have been increased.

"One new Ordnance use for steel in sizable quantities is that of ammunition shipping containers. It is estimated that over 125,000 tons a quarter may be required for packaging complete rounds and powder charges. Although not yet officially standardized by the Ordnance Department, orders for steel to produce large numbers of containers in the second and third quarters have been placed. Hot and cold rolled sheet and strip are required, with more than one-third the tonnage to be purchased in the form of welded steel tubing. This amounts to more than 25 million ft. of tubing, which will utilize most of the heavy welding tube capacity of the country.

"Contrary to many opinions, steel ammunition shipping containers are not intended to save paper nor to use excess steelmaking capacity. No large saving in paper will be accomplished, since an inner fiber carton will be used in conjunction with the steel container in packaging rounds having the greatest production, such as the 60 mm. and 81 mm. mortar and the 75 mm. and 105 mm. howitzer shells."

W. R. Webster Celebrates 50 Years' Service to ASME

Bridgeport, Conn.

• • • **Seventy-five distinguished** leaders in the engineering profession, civic and industrial affairs and representatives of the Army and the Navy, joined in paying tribute to William R. Webster, chairman of the Board of Directors of the Brideport Brass Co., in recognition of his half century's service in behalf of the American Society of Mechanical Engineers.

W. Gibson Carey, Jr., president of the Yale & Towne Mfg. Co., and a past-president of the Chamber of Commerce of the United States, was the principal speaker at the testimonial dinner.

Bryant Flays Scrapping Excess Tools Proposals at Joint Machinery Conference

Chicago

• • • **Greater availability** of most industrial items was detailed here last week to delegates to the joint war conference of the Southern Supply & Machinery Distributors Association, Inc., the National Supply & Machinery Distributors Association, and the American Supply & Machinery Manufacturers Association, Inc.

The best condition on deliveries in three and a half to four years now exists on precision tools, R. G. Thompson, Lufkin Rule Co., declared. Larger buyers currently are shopping for spot delivery, but stock replacement for distributors now is being made in 30 days on many tools, he said. The industry generally feels it is "over the hump" but looks for a consistent heavy demand for some time. Many discontinued tools now are being brought back into industrial lines, it was stated.

W. E. Caldwell, Cleveland Twist Drill Co., predicted good business for the drill industry for five years following the end of the war, but warned distributors on the necessity for maintaining their profit margins.

Buyers of hand tools soon will be expressing brand preferences and again demanding quality materials and new and improved tools, Edward J. Weierstall, North Bros. Mfg. Co., stated, although the heavy demand which has to a great extent erased these customer requirements very likely will continue until the end of the war.

C. F. Conner, B. F. Goodrich Co., foresaw a gradually improved quality of mechanical rubber goods, and employment of rubber for many new uses with easing in the synthetic rubber situation.

With 1943 chain production 400 per cent greater than normal, the few cutbacks in chain requirements have not been sufficient to help the badly pressed distributor greatly, D. S. Brisbin, Columbus McKinnon Chain Corp., stated. He expected an orderly postwar picture, pointing out that the industry had no reconversion problem.

L. M. Knouse, Stanley Works, was gloomy over the electric tool situation, stating that although the material situation had eased, scarcity of labor still greatly restricted production. Deliveries currently are about three months behind, he said.

Speaking on the general program, A. G. Bryant, president, Bryant Machinery & Engineering Co., flayed proposals to solve the problem of war and postwar surpluses by scrapping them, and urged every effort be made to utilize them to the fullest possible degree.

"Wide proposals to dispose of surplus by scrapping should be given no consideration," he said. "Industry must be consistent in its economics. A few years ago it condemned the agricultural program which involved the killing of little pigs. It cannot consistently today condone the scrapping of valuable machinery which might add to the wealth of the nation."

He placed the value of surplus government property to be disposed of at between $50 and $75 billions.

H. P. Ladds, chairman, National Screw & Mfg. Co., reporting for the special committee on surplus stocks, emphasized the need for legislation to determine policies governing disposition of surplus war material. Thomas W. Howard, representing the U. S. Chamber of Commerce surplus war property committee, was optimistic that legislation be enacted.

"I think," he said, "that when we reach the period of actual demobilization, we will find legislation and administrative procedure in effect that is in substantial accord with our recommendation."

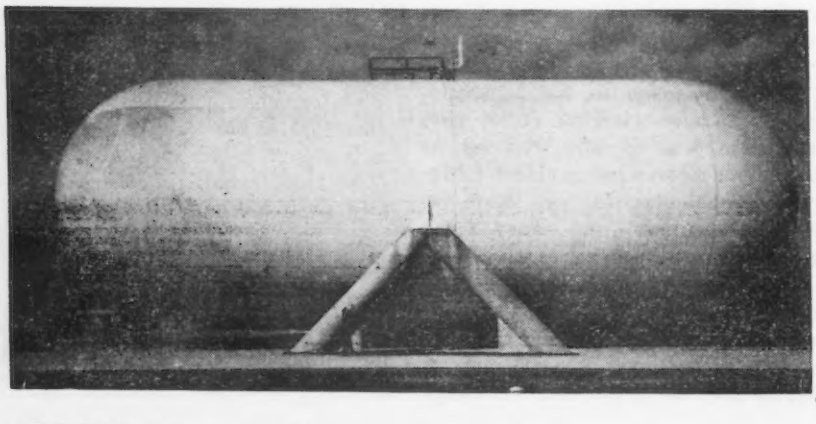
Lt. Col. J. P. Woodlock, executive asistant to the administrator, surplus war property administration, outlined the SWPA's program which he summarized in seven points:

(1) Surpluses will be large and the quantities will be influenced by the nature and length of the war;
(2) Government owned surpluses arising from terminated contracts are now piling up in manufacturers' plants;
(3) These surpluses are already tying up millions of dollars;
(4) We have set a pricing policy designed to move this leftover material;
(5) Regulation No. 1 has just been issued by the Surplus War Property Administration, covering surpluses to be declared by Army, Navy and Maritime Commission;
(6) This Regulation assigns consumer goods to the Treasury Procurement, capital and producers' goods to Reconstruction Finance Corp., food to War Food Administration, and all surpluses abroad to the Foreign Economic Administration.
(7) This administration is setting the policy—the disposal agencies will handle and sell the surpluses.

He added that it is the Administration's policy to utilize existing channels of distribution, since it is believed that a more orderly process of distribution can be attained through marketing organizations familiar with a particular product. A fundamental principle emphasized in connection with the disposal of property was that of testing the market to determine fair prices.

Addressing an executive session of the manufacturers' group, George W. Wolf, president, United States Steel Export Co., was reported to have urged postwar destruction of trade barriers and to have warned that only multi-lateral trade could create the highest possible standard of living for most peoples of the world. He warned that restoration of world order after the war depends largely upon (re-establishment of a sane and sound economy," adding that, from an economic standpoint "we currently are getting nothing in return (for war exports) and cannot continue this exportation of our wealth and our labor after the war unless there is something for something."

ISOBUTANE TANK: *This is a newly designed isobutane tank for the catalytic cracking project used in manufacture of 100 octane aviation gasoline at Wilmington, Cal., refinery of Shell Oil Co., Inc. The tank has a capacity of 20,000 bbl.*



Shipyard Vacation Pay Schedule May Set Pattern at Steel Wage Case

Washington

• • • **With industry** members dissenting, the National War Labor Board Shipbuilding Commission has directed the employes of the Bethlehem Steel Co., shipbuilding division, at its San Pedro, Cal., yard be given one week vacation with pay if serving a year or more and two weeks with pay for those with five or more years seniority. The board said that this new vacation plan is identical with those in effect in other yards of the company. The vacation schedule which has been in effect at the yard, it was stated, provided for one week after three years and two weeks after 15 years.

The CIO Industrial Union of Marine and Shipbuilding workers, is bargaining agent for the approximately 3000 production workers covered by the schedule. The commission's order states that the one week vacation provision is to be effective as of May 1, 1943, and that the two week provision is to be effective as of May 1, 1944. Employees who have earned a vacation for the 1943 period and have not received it, are to be granted their 1943 vacation in 1944.

A request by the union that all employees who left the company's employ after Dec. 31, 1943, be compensated for vacations they had earned before leaving, was denied by the commission with labor members dissenting.

The terms of the commission's order are subject to review by the NWLB upon petition by either of the parties or on the board's own motion.

This decision has aroused interest as possibly setting a pattern for the steel wage case now before the WLB. The USWA is asking for one week's vacation with pay for steelworkers who have been with a company for a year or more, and two weeks' vacation with pay for employees who have been with a company for three years or more. At present steelworkers get one week's vacation with pay after three years' service and two weeks vacation with pay after 15 years' service.

Lack of Pool Orders Deplored

Cleveland

• • • **Figures on** the machine tool industry volume are beginning to take on a heartening appearance now that new military buying has begun to show. WPB statistics show that new orders for April exceeded monthly shipments for the first time since last August although the month's total was still far from staggering. It is apparent from this order volume that the upward trend, now well recognized, was actually at work much earlier.

It has been disheartening to some members of the industry that no pool orders for any of these urgent tools has been forth coming but it is expected that the industry will buckle down and produce as usual. It is noted that the volume of pool machine tools is now at its lowest point and is barely over 2000 machines. Excesses of certain types of common machines are believed to exist among these few which may further retard eventual disposition of the remainder.

In the hurry to get out the badly needed shell lathes and other urgent munitions tools some outsiders to the trade are entering the picture. Only last week a nearly bare machine shop was observed which is in the process of tooling up to build shell lathes—a product never before made by this firm. The owners seemed certain that this presently bare shop would be producing finished shell lathes by August.

Labor shortage troubles have been an ever present headache to Cleveland machine tool builders but it is thought now that the top urgency of the newest tool contracts may give a sufficiently high priority rating with the USES to channel slightly more labor in their direction.

Salvation of the 26-29 age group has also been of some recent assistance in making future plans more certain. Employment ceilings are just in the offing for Cleveland, however, and the WMC promises that they will be placed in effect for non-essential industries beginning June 1. This action may divert some help to machine tool builders but a ceiling for essential industries, thus catching the latter, will hit about July 1. Greater preference for tool builders by Area Production Urgency Committees should lend some assistance when tool shops become loaded with top urgency machinery orders.

Container Allotments Set

Washington

• • • **The steel** shipping container industry has been assured rolling space for its 138,000-ton allotments for the third quarter, WPB has announced. At the same time it was pointed out that members of the Steel Containers' Industry Advisory Committee at a recent meeting were told that rolling mill space for third quarter production is fully allocated and some fourth quarter space is already taken up. This condition is due to large military requirements which in the case of sheet steel exceed the supply, Government representatives said.

LIFE "BOTTLES": *Huge piles of oxygen cylinders lay in neat rows at the New Jersey plants of Walter Kidde & Co. Because high altitude bombing and escort flying has tremendously stepped up need for the life-sustaining "bottles," mass production of the tanks has become a big business.*

WLB Grants Retroactive Pay In Sheffield Steel Corp. Case

Washington

• • • **With industry** members protesting that the amount of the increase was in itself a contravention of wage stabilization policies and that the retroactivity of the award imposes a crushing burden which this company by no stretch of the imagination could have anticipated, the War Labor Board last week upheld the eighth regional board directing a wage increase, retroactive to November, 1942, for employees of the Sheffield Steel Corp., Houston, Tex.

The national board majority said that the directive established proper rates as of the time the dispute over wages was certified to the board and therefore does not violate the WLB's policy as to retroactivity of wage awards. The national board on April 1, 1944, denied a petition by the company for a review of the regional board's decision directing a common labor range of 60½c. per hr. and a general increase of 8c. above the common labor rate retroactive to November, 1942. The company's approximately 1700 workers were represented by CIO's USWA.

Industry members declared that the majority decision "illustrates that crushing penalties are being imposed by the War Labor Board against industry due to its policy of refusing to consider obvious inequities whenever an agency of this board assesses retroactivity back to the expiration of an agreement of the board or the date of certification of the dispute to this board."

Dexter Keezer, public member, wrote an opinion for the majority position.

Mr. Keezer said the rates set by the regional board's order "did not become proper rates only when they were finally determined," but that it was important to "recognize that the factors affecting that determination were the same in November, 1942, and in July, 1943 the date suggested by the company as they are today. The decision is simply that wages found to have been proper as of Nov. 20, 1942, should be paid of that date."

COMING EVENTS

June 5-6—Machinery Dealers National Association, New York.

June 5-6—Regional Conference of Eastern Chapters of N.I.A.A., Atlantic City, N. J.

June 5-7—SAE National War Materiel Meeting, Detroit.

June 5-7—American Society of Refrigerating Engineers, Pittsburgh.

June 19-22—American Society of Mechanical Engineers, Pittsburgh.

Oct. 5-7—SAE National aircraft engineering & production meeting, Los Angeles.

Oct. 5-6—AIME Electric furnace steel conference, Pittsburgh.

Oct. 10-11—Gray Iron Founders' Society, Inc., Cincinnati.

Oct. 12-14—The Electrochemical Society, Inc., Buffalo.

Oct. 16-18—AIME Fall meeting, iron and steel division, Cleveland.

Oct. 16-20—American Society for Metals, Cleveland.

Dec. 4-6—SAE National air cargo meeting, Chicago.

To "Spell Out" Auto Output Details

Washington

• • • **Details for the** partial resumption of passenger car production, perhaps 2,000,000 it was suggested, may be "spelled out" by late July. This possible pattern for limited conversion to civilian output was outlined by WPB Automotive Division Director John H. Middlekamp to the WPB Automotive Original Equipment Parts Industry Advisory Committee May 19. The meeting followed a recent WPB conference with automobile manufacturers at which general plans for reconversion were discussed.

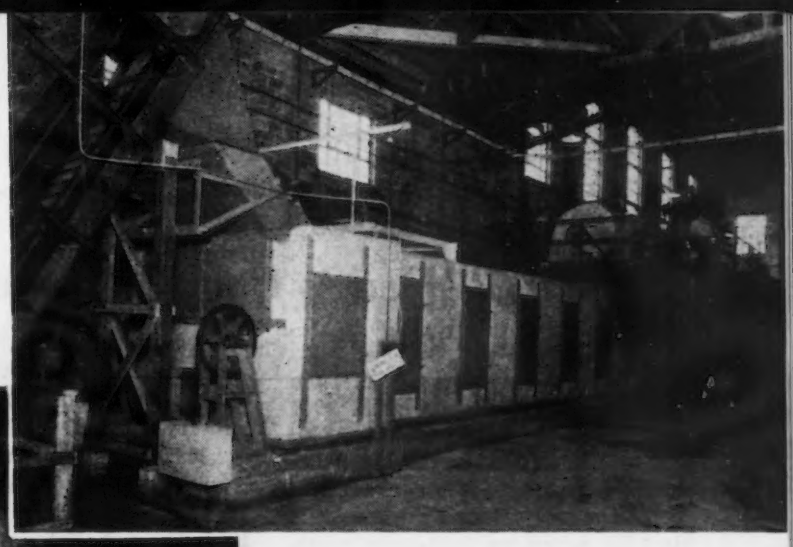
Mr. Middlekamp told the Parts Advisory Committee that the first step in the program must be a determination of the number of cars to be made and allocation of portions of the total to the various manufacturers. He said that the cars to be built will probably be 1942 models with modifications.

Parts manufacturers said that they could not advise WPB intelligently on their ability to cooperate with the board in a partial resumption of automobile manufacture until they had been provided with tentative orders for definite quantities of specific parts. Members of the committe differed on whether the gap between war production and peacetime production could best be filled by the manufacture of such parts as would be required for partial resumption of new car manufacture or by unrestricted production of replacement parts for cars now on the road. WPB said that most of the manufacturers were of the opinion that unrestricted manufacture of replacement parts was to be preferred. Such parts, they said, would be "sugar in the bin," even if they did not move into civilian channels immediately.

LONG RANGE TANKS: *Mechanics check over long range fuel tanks at a California airport. These tanks, many of which are so designed that they can be jettisoned from airplanes after being emptied, are used on ships flying beyond their normal gas carrying range. The tank in the foreground was used in the recent Los Angeles to New York flight of Lieut.-Col. Jack Carter in a P-51 Mustang.*

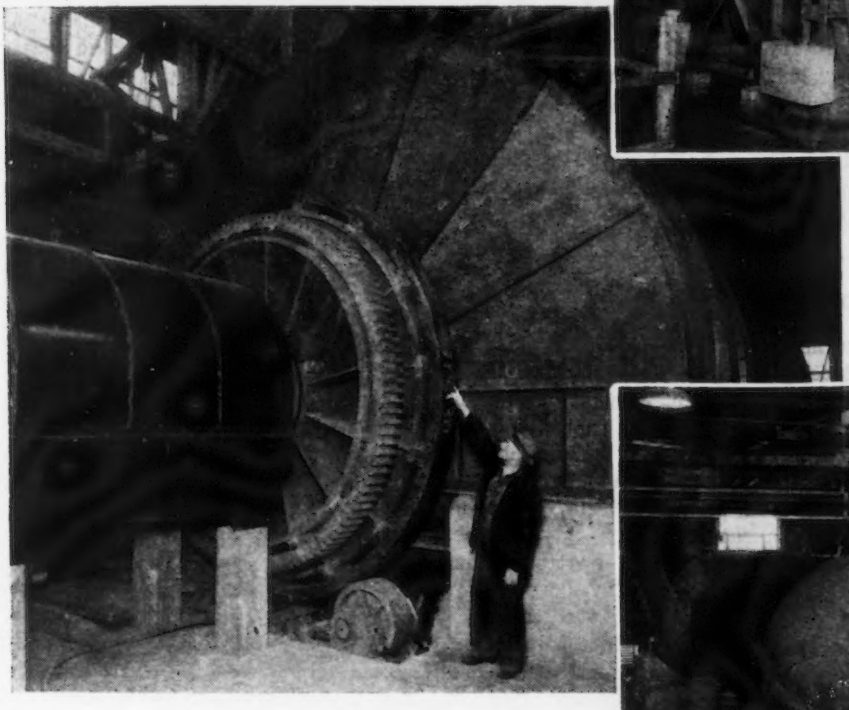
DPC Detinning Unit

• • • The only one of some 26 proposed Defense Plant Corp. detinning plants that was completed started production recently at Birmingham, Ala., under the operation of the Southern Detinning Co. The plant was designed and built by H. K. Ferguson Co., Cleveland, based on the Thermit Corp., New York, detinning process. Johnson & Jennings Co., Cleveland, has a management contract with DPC for supervision of plant operations.



ABOVE

CLEANING: *After shredding, cans are conveyed through this incinerator where extraneous matter is charred off. The furnace temperature of 425 deg. F. is hot enough to char foreign matter but not hot enough to alloy the tin with the steel can.*

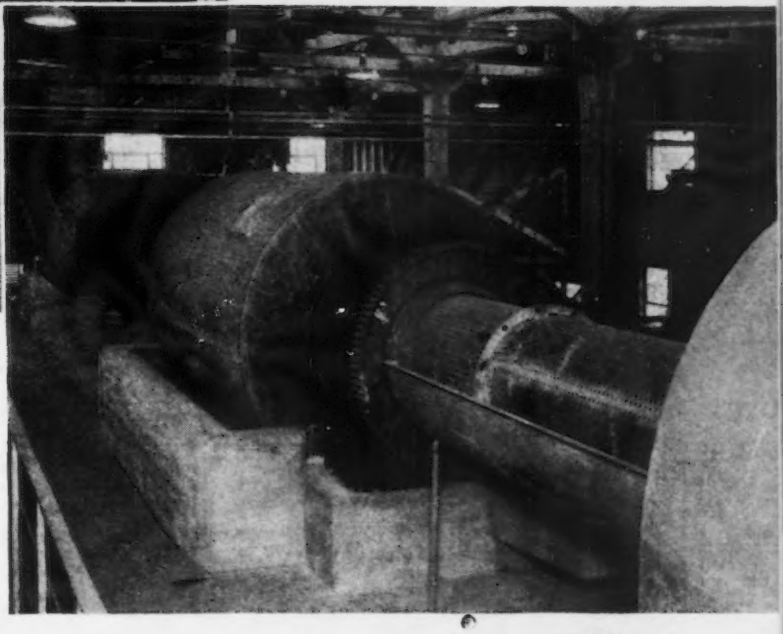


ABOVE

DETINNING: *After washing, the shredded cans pass to this detinning drum. Caustic soda is used in removing the tin from the steel. The tin bearing solution, sodium stannate, precipitates and falls to the bottom of the drum and is removed through pipes.*

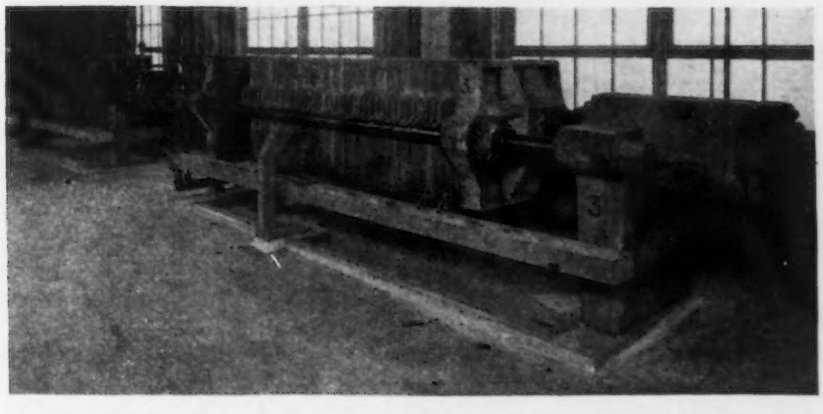
RIGHT

WASHING: *After detinning, shredded cans are washed to remove adhering detinning solution. As this solution builds up in the wash water, it is recycled to the detinning drum for recovery of the tin oxide.*

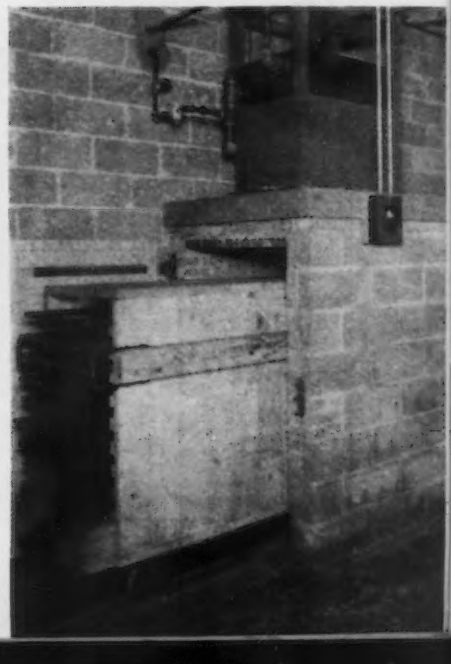


BELOW

OXIDE DRYER: *The tin oxide is dried after it leaves the filter presses. The wet chalky substance is placed on pans in thin layers and passed through this warm air circulator. It is then packed in bags for shipment.*



TIN RECOVERY: *After baling, the detinned cans are shipped as scrap to steel mills. These presses filter the tin chalk or oxide from the black mud that collects in the process. The oxide is further treated, the mud is disposed of in sludge pits, and the solution remaining after filtering is re-used in the detinning operation.*



Roosevelt Discusses Lend-Lease Material Shipped to United Nations

Washington

• • • **Lend-lease shipments** of steel to Great Britain from March, 1941, through March, 1944, totaled 5,750,000 tons, and similar shipments to Russia were 1,450,000 tons, President Roosevelt told Congress recently in his 15th report on lend-lease operations. Total lend-lease aid to all allied nations aggregated $24,224,806,000. Included in these shipments were more than 30,000 planes, about 25,000 tanks and over 800,000 other military vehicles. Of the total value, $12,942,000,000 was represented by munitions and $5,106,000,000 by industrial materials. From March, 1941, through February, 1944, shipments to Russia included 350,000 tons of steel rails, locomotive and car wheels and axles, 420,000 tons of aluminum, copper, nickel, zinc and other nonferrous metals, and $200,000,000 worth of machine tools.

Discussing reverse lend-lease, the report said that by the first of this year the dollar value of goods, services and facilities provided by the United Kingdom to the United States Army, Navy, and Air Forces, and Merchant Marine totaled $1,526,170,000.

About $2,000,000,000 worth of lend-lease war supplies have been shipped to the Pacific and Far East theaters for the war against Japan. About $1,064,196,000 went to India and China in the period ended February, 1944, while $806,539,000 went to Australia and New Zealand. By Jan. 1, 1944, the supplies, facilities, and services American forces have received as reverse lend-lease had cost those countries $450,000,000, and, the report said, the rate of reverse lend-lease was rising.

Steel Casting Output Up in March

• • • **Orders booked for** steel castings during March, 1944, amounted to 162,575 tons as compared with 173,592 tons for February, 1944, and 202,731 tons for March, 1943. The production of steel castings amounted to 174,626 tons for March, 1944, as compared with 161,359 tons for February, 1944, and 176,470 tons for March, 1943. These statistics were released today by the Bureau of the Census, Department of Commerce.

The preliminary statistics for March, 1944, were compiled from returns of 187 manufacturers who produced castings for sale. The statistics for the months of July, 1942, to February, 1944, inclusive, were compiled from returns of 193 manufacturers and for the period January, 1940, to June, 1942, inclusive, from returns of 187 manufacturers.

The manufacturers reported actual monthly capacity of 227,165 tons for March, 1944, and 215,976 tons for February, 1944. Production was 76.9 per cent of actual capacity for March, 1944, and 74.7 for February, 1944.

Year and Month	Orders Booked During Month, Less Cancellations			Production During Month			Actual Monthly Capacity	Ratio of Production to Capacity
	Total	Railway Specialties	Misc. Castings	Total	Railway Specialties	Misc. Castings		
	Net Tons	Net Tons	Net Tons	Net Tons	Net Tons	Net Tons	Net Tons	Per Cent
1944								
January	167,739	18,181	149,558	159,795	25,826	133,969	215,994	74.0
February	173,592	27,244	146,348	161,359	27,488	133,871	215,976	74.7
March[1]	162,575	36,202	126,373	174,626	30,760	143,866	227,165	76.9
1943								
January	213,130	23,020	190,110	154,736	11,440	143,296	201,859	76.7
February	191,217	17,658	173,559	151,530	12,832	138,698	199,791	75.8
March	202,731	34,064	168,667	176,470	17,777	158,693	207,378	85.1
April	165,792	20,461	145,331	161,403	17,467	143,936	201,701	80.0
May	192,531	19,951	172,580	163,812	21,424	142,388	202,441	80.9
June	171,774	18,370	153,404	163,934	22,108	141,826	202,455	81.0
July	187,281	15,637	171,644	159,783	19,761	139,022	203,793	77.9
August	200,634	39,637	160,997	159,832	20,883	137,949	200,666	79.2
September	214,066	66,146	147,940	157,818	24,564	133,254	203,203	77.7
October	211,341	28,876	182,465	163,888	27,015	136,873	201,932	81.2
November	209,276	33,901	175,375	158,813	25,780	133,033	206,519	76.9
December	173,627	35,039	133,588	158,626	27,613	131,013	217,079	73.1
Total (year)	2,333,420	352,760	1,980,660	1,928,645	248,664	1,679,981	2,443,821	78.8
1942								
January	150,551	35,723	114,828	134,778	46,357	88,421		
February	179,880	54,409	125,471	133,726	45,013	88,713		
March	211,081	43,997	167,084	146,507	48,335	98,172	(2)	(2)
April	191,195	26,558	164,637	149,625	45,158	104,467		
May	199,619	11,025	188,594	131,492	25,644	105,848		
June	208,885	11,218	197,667	132,053	21,658	110,395		
July	202,334	3,610	198,724	135,700	16,251	119,449	162,967	83.3
August	141,239	[3]—13,480	154,719	139,184	12,988	126,196	164,651	84.5
September	177,478	13,546	163,932	139,774	12,051	127,723	171,730	81.4
October	179,537	7,708	171,829	152,080	13,979	138,101	182,168	83.5
November	173,285	9,385	163,900	140,399	11,133	129,266	179,733	78.1
December	172,263	15,446	156,817	143,860	10,785	133,075	189,241	76.0
Total (year)	2,187,347	219,145	1,968,202	1,679,178	309,352	1,369,826	.....	.....

[1] Preliminary figures.
[2] Figures not available.
[3] Cancellations exceeded orders booked during month by 13,480 short tons.

"Delegation of Authority" Orders Altered by WPB

Washington

• • • **Directive 31,** which is a delegation of authority to the Army and Navy Munitions Board, has been amended to bring it up to date, and a new directive, No. 32, which delegates authority to the Maritime Commission and War Shipping Administration, has been issued, WPB announced. The new directive grants Maritime Commission and WSA authority to issue preference ratings on form WPB-646.

The amendment to Directive 31 changes the third criterion for the rating of Engineer Corps construction, to provide that ANMB can issue preference ratings on river and harbor construction and on certain flood control projects. The amendment also includes authority for ANMB to rate Civil Aeronautics Administration construction of certain airports and airway facilities. These projects have been rated under a delegation of authority dated Dec. 6, 1943.

Authority for ANMB to grant preference ratings on form WPB-542 for maintenance, repair or operation of ships, including those of neutral countries, after clearance of the vessels' status with the Foreign Economic Administration is also included. Finally, the directive specifically grants ANMB the authority to issue re-ratings in accordance with Priorities Regulation 12, which governs preference re-rating procedure.

Automotive War Production Council Attacks Unionization of Management

Detroit

• • • **Alvan Macauley**, president of the Automotive Council for War Production, which represents 550 established companies employing 1,200,000 workers, in a public statement to the President and Congress, asked: "Can union leaders unionize management and take over the control of war production?" "Are their organizing drives for this purpose to be allowed to interfere with the efficiency and effectiveness of this production?" "Will they be allowed to disrupt American industry by using it to experiment with a new and untried form of union-controlled management?"

Foreman's strike and hearing story, see page 87.

The council protested such action on the part of union leaders as being detrimental to the war effort. It demands that this issue, which results directly from the fact that the federal laws are too vague in respect to the status of management, be taken up by Congress in order to amend and clarify the necessary laws of the War Labor Disputes Act before the production effort is further impeded by this crisis.

Mr. Macauley stated that an unfair system of collective bargaining prevails with union leaders sitting on both sides of the table.

The Council has never intervened in the collective bargaining problems of employer-employee relations, and has no intention of departing from this practice, he said. He lauded the automotive industry which is producing a large part of our national armament output and which will after the war be relied upon to provide jobs upon its reconversion.

Bell Reports Present Output Levels Unaffected by Cutback

Buffalo

• • • **A reported cutback** in the fighter plane contracts of Bell Aircraft Corp., to average as high as 20 per cent, "does not represent a cutback from present levels of production," according to a company spokesman.

"What the cutback will mean," he explained, "is that production, which now is being increased, will not reach as high a level as scheduled."

Bell's employment, which was being geared for extreme high level production, will be reduced somewhat as a result of the cutback. Layoffs on a moderate scale will start within a few weeks on the basis of seniority.

Reported additional cutbacks in Army as well as Navy fighters may not hit Curtiss-Wright plants in Buffalo so severely as this company does not have as high a proportion of its total production in fighters.

Navy Terminates Plane Contract With Brewster

• • • **The Navy Department** has notified the Brewster Aeronautical Corp. that the company's contract for production of 1500 *Corsair* fighting planes will be terminated and that production of that plane at Brewster's Long Island City, N. Y., and Johnsville, Pa., plants would cease by July 1. By that date those planes now in advanced stages of construction will have been completed. It is estimated that approximately one-half of the original contract will have been completed.

The termination is a result of the reduction in the over all fighter plane program for the Navy, who estimates total savings will amount to $180,000,000.

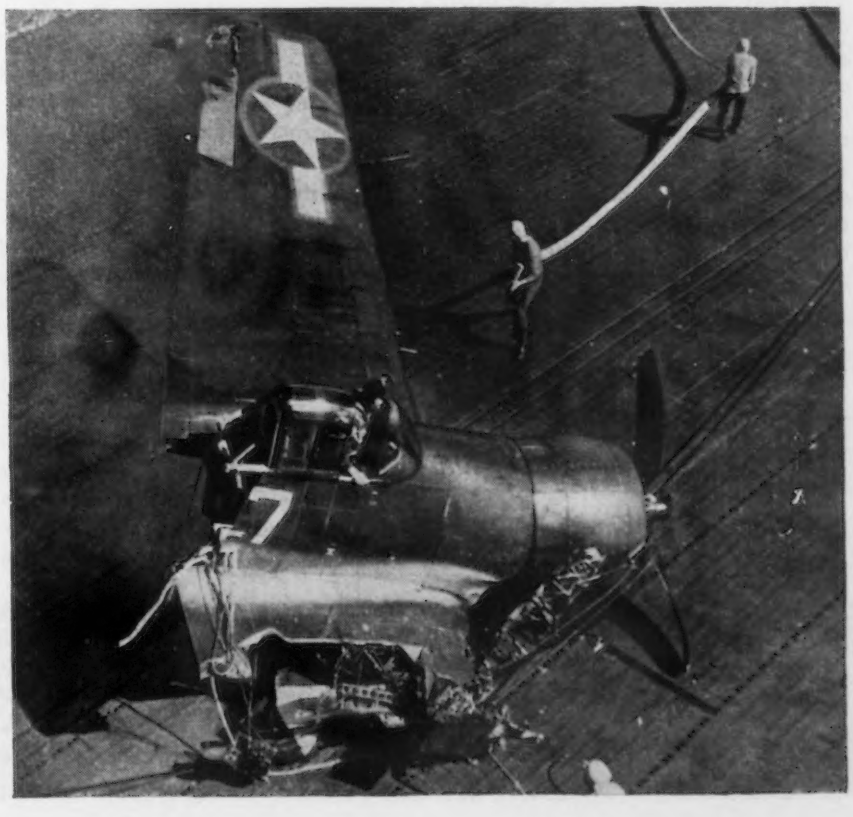
This reduction in the immediate future will be applied principally to the *Corsairs* which are also being produced by Goodyear Aircraft Corp., and the Chance Vought Division of the United Aircraft Corp.

Reverse Lend-Lease in India Totals $35 Million, FEA Says

• • • **American military** forces in India received materials worth more than $35,000,000 as reverse lend-lease in the first two months of this year, the Foreign Economic Administration reported recently. Nearly one-half of this was represented by petroleum products.

The volume in the two months was equal to the total received during the entire year 1942 and about one-half the total received during 1943, FEA said. The total of reverse lend-lease in India since its inception in March, 1941, amounts to $149,512,000.

DAMAGED BUT LANDED: *Ensign R. Black, Navy "Hellcat" pilot of Brigham, Utah, landed his damaged plane on deck of carrier in what is said to be the most remarkable carrier landing of this war. Note the condition of the plane.*



Industry Presents Commercial Factors of Steel at WLB Hearing

Washington

• • • **Hearings in the** CIO-USWA wage case before the "basic steel" panel of the WLB were scheduled to be resumed on May 31, following a week's adjournment taken to allow steel representatives participating in the proceedings to attend the American Iron and Steel Institute meeting in New York.

In the day-and-half hearings last week, attacks were continued on the demand for a guaranteed annual wage by Roswell Magill, tax consultant; F. M. Gillies, general superintendent of the Indiana Harbor plant of the Inland Steel Co.; and Kemp G. Fuller, chairman of the marketing division, U. S. Steel Corp.

Mr. Magill said that the refund provisions of the Revenue Act do not in any way support the union's claim for a guaranteed annual wage. Mr. Gillies, referring to the union contention that its guaranteed annual wage demand can be met through the proper planning of steel production on an annual basis, said that such regularization of production is desirable from the view of management, stockholders and the public, as well as employees, but is impossible.

Mr. Fuller, supporting his remarks with charts, said that the magnitude of the variations in the demand for steel products precludes the possibility of their speculative production without firm orders, with certain exceptions, principally in wire products and standard pipe. Nevertheless, he pointed out, efforts of the steel industry to level out production, where possible, clearly reflect that the industry considers it desirable and has taken many steps to regularize operations. Such action, however, he said can affect only a limited portion of total steel production.

CIO-USWA Arguments that carry-back and carry-forward provisions of the income tax laws could be used by steel companies to guarantee their income were branded as false by Mr. Magill, who was Under-secretary of the Treasury in 1937 and 1938. The arguments, he declared "seem to be designed wilfully to mislead." Contrary to the union's assertions, Mr. Magill said that the provisions were not surreptitiously made into law, but actually were first employed in the 1918 Revenue Act and that their purposes were publicly explained and were in no sense designed to give a bonus to any industry, not to provide a fund on which wages can be raised or guaranteed.

"Since the excess profits of a single year are taxed at confiscatory rates, elementary justice requires that the net operating losses of succeeding years be allowed as an offset against those profits, so that the Treasury shall not collect a tax on more than the actual corporate income for the period," Mr. Magill declared.

Mr. Magill told the panel that the Treasury makes no guarantee of anything in the law and "has not underwritten the steel companies' losses and will not repay them." The most it will do, he explained, is to redetermine the taxes for past years, if the company has off-setting losses.

Mr. Gillies pointed out that stabilization in the steel industry is dependent upon stabilization of the steel buyers' needs. These buyers were said to fall into three broad categories: 1—Those who supply necessities to ultimate consumers. 2—Those who supply articles for the luxury field. 3—Those who supply capital goods and materials for replacement, repair and maintenance.

It is most difficult, Mr. Gillies said, to determine the needs of the second class, and those of the third class are wholly unpredictable. Furthermore, it was explained, the needs of the second and third class of buyers fluctuate widely with respect to metallurgical and physical specifications, and, in this respect as well as in volume, the needs of the second and third classes are incapable of being accurately foreseen. These two classes, it was stated, represent about 75 per cent of the total demand.

To this extent, Mr. Gillies said, steel is a custom goods business which must be produced to order. This was declared to set a limit beyond which it is impossible to regularize steel production. It follows, Mr. Gillies explained, that a guaranteed annual wage would involve a substantial payment for work not done.

Mr. Fuller also pointed out that under normal conditions of demand, production of finished steel products for stock is possible only to a very limited extent and explained that purchases are in accordance with the needs of customers. The buyers of steel, in turn, were said to be chiefly dependent on or influenced by: 1—Purchases and desires of ultimate consumers—the man on the street or the farm. 2—Derived demands stimulated by these ultimate consumers. 3—Governmental policies—national and international. 4—Weather conditions.

The ultimate consumers' purchases, Mr. Fuller said, are basic to the demand for steel. Moreover, he pointed out, they cannot be controlled or predicted as to type of product, volume or time of purchase. In this country alone, the panel was told, there are 136,000,000 people with a wide variety of desires and needs. Government policies (which include such subjects as levels of taxation, interest rates, and public works) were declared to be important as they influence consumer purchases and thus affect the volume of the manufacturers' production. Such manufacturers, it was explained, place orders for steel in a wide variety of shapes, sizes and grades for the finished products which they will manufacture. It was further pointed out that the timing of many of the inter-dependent activities in connection with demand, and the rates of such activities are influenced strongly by weather conditions.

J. L. Perry Comments On Carnegie-Illinois Plate Case Outcome

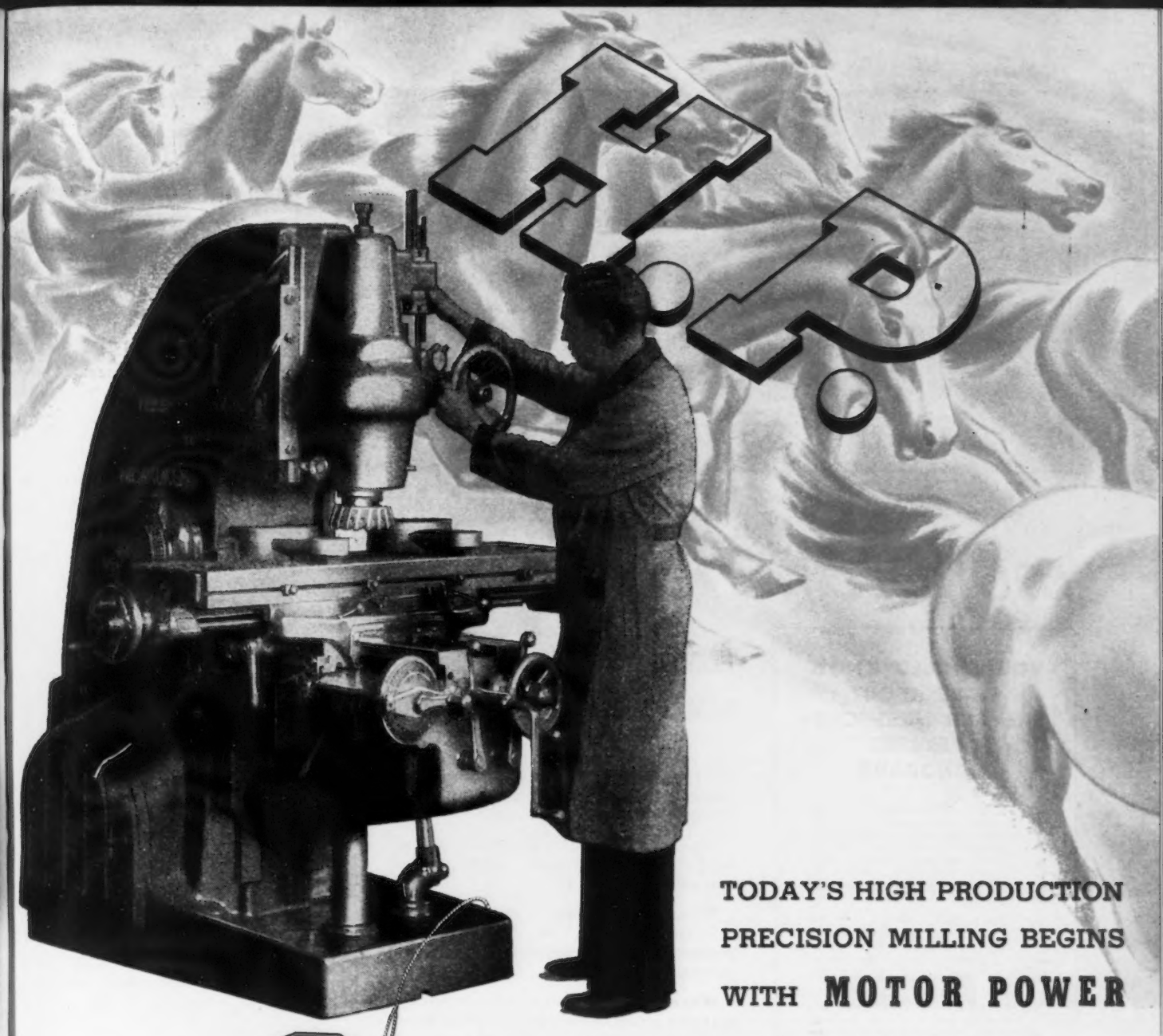
Pittsburgh

• • • "We are happy to have the public know that the unfair and unsubstantiated accusations made by the Truman Committee of the delivery by Carnegie - Illinois of defective plates have been completely refuted," J. L. Perry, president of Carnegie-Illinois Steel Corp., U. S. Steel subsidiary, said in commenting upon today's acquittal of Carnegie-Illinois in the criminal suit prosecuted by the government against it in the federal court at Pittsburgh. "No witness," Mr. Perry continued, "testified either before the Truman Committee or before the federal court at Pittsburgh that any defective steel plates were ever supplied by Carnegie-Illinois Steel Corp. from Irvin Works or elsewhere."


J. L. Perry

Mr. Perry added: "About a year ago, when indictments were found against Carnegie-Illinois Steel Corp. relative to alleged false reports of tests of steel plates at Irvin Works, I stated that Carnegie-Illinois was confident that when it was afforded the opportunity to present in court the full facts, the outcome would be complete exoneration. Such statement reflected my firm conviction that none of the plates supplied by Irvin Works were either defective or inferior, and that any irregularities in test reports which might have occurred concerned relatively unimportant variations from the specifications. My statement has since been proved to have been entirely accurate.

"After an exhaustive three weeks' trial, just concluded before Judge Robert M. Gibson in the U. S. District Court at Pittsburgh, such complete exoneration has been obtained. Today the jury in that case acquitted Carnegie-Illinois of the charges, contained in 47 counts of an indictment, that it had falsely certified tests on certain plates furnished to or for various government agencies.



TODAY'S HIGH PRODUCTION PRECISION MILLING BEGINS WITH **MOTOR POWER**

In years past it was customary to purchase milling machines by range . . . depending on the size of work to be handled. The motor power was given insufficient consideration by most purchasers. For example, a model 2 machine with 3, 5 or 7½ hp. served practically all requirements in those days.

Today, however, with the constant changing of milling techniques, range is not the first consideration—hp. becomes the *number one factor* . . . the *starting point* when purchasing milling equipment. No machine which is engineered to handle work requiring from 3 to 7½ hp. can be expected to stand up very long if 15 to 20 hp. is substituted on the spindle.

You can always be sure that a Kearney & Trecker "Milwaukee" is correctly designed in terms of motor power, from the drawing board stage on through to the completed machine. Milwaukee Milling Machines are power-engineered — POWERATED — designed and built in keeping with their hp. range plus the normal overloads encountered within their field of job applications.

The next time you need milling equipment, think in terms of motor HP. for heavy cuts — range for light cuts. Consult a Kearney & Trecker field engineer. Explain to him the types of jobs which you intend milling. He will help you in deciding what PoweRated Milwaukee Milling Machine is best best suited to your specific needs.

PoweRated
Engineered for a Specific HP. Range

MEANS EVERY MILWAUKEE MACHINE IS POWER ENGINEERED TO DO THE JOB

Milwaukee *PoweRated* Milling Machines • Standard Models—Horizontal, Vertical and Bed Types — available in Motor ranges from 3 to 25 HP. • C.S.M. (Carbide Steel Milling) machines 20 to 50 HP. • Special Machines—Consult K&T engineers

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Back the Attack — **BUY MORE BONDS**

Milwaukee Machine Tools

London Economist Examines Postwar Steel Industry in Great Britain

By WALTER HILL,
Assistant Editor, "The Economist"

• • • **The latest dividends** of British iron and steel companies, expressed as percentages of the market price of shares, show a return which exceeds the average for industrial shares by about 1½ points and is about 2 points above that obtained on equities whose postwar recovery prospects are considered to be good. This disparity indicates that investors are inclined to await further proof of the ability of the iron and steel industry to maintain its profit earning capacity after the war. The disparity, in fact, is a premium for the risk of lower dividends after the war.

On the demand side, there is, of course, the risk of instability, which alone seems to justify a risk premium. In the past, the iron and steel industry in Britain (as elsewhere) has been subject to violent ups and downs in the demand for its products and, consequently, in its profits; moreover, there is no evidence to suggest that it will enjoy as consistent a postwar demand as it has enjoyed since 1939. Nevertheless, it would seem that, at least during the period of reconstruction after the war, the demand for steel products should remain at a high level, both in the home market and abroad.

The British home market should again be capable of absorbing at least as much steel as before the war, that is about three-quarters of production, by volume. The prospect is much better than 25 years ago, for in contrast to World War I when the industry added some 50 per cent to its ingot capacity, such additions to its capacity as have been made since 1939 have been mainly at the finishing end and in special steels. The industry's capacity, in fact, has not been inflated during the present war, and much of the expenditure on plant at the finishing end has been financed by Britain's Government.

Export markets are in a different category and here the prospect is less plain. Although the British steel industry shipped abroad only about a quarter of its output by volume before the war, exports were of great importance, amounting to nearly £50,000,000 in value in 1937. The prospect is undefined, not only because steel-making capacity has been enormously

extended since 1938 in the United States, Canada, Australia, India, South Africa and elsewhere, but also because British steelmakers may not find it easy to produce steel at competitive prices, but quality steel they will always produce.

The question of costs may be considered under two headings: Raw materials and mill practice.

In iron ore Britain is not likely to be at a serious disadvantage; local low grade iron ore can now be converted cheaply in inland plants, while coastal plants will again be able to import high grade ore at reasonable prices. In scrap, too, British steelmakers should be in as advantageous a position as those of other countries.

The difficulty is likely to arise in coal. There is, of course, plenty of coal in Britain; but its cost has risen sharply since 1939, mainly as a result of higher wages, unaccompanied as yet by higher productivity. Between 1938 and 1943, wages per ton of coal produced have been nearly doubled, and they have since shown a further increase.

How seriously the rise in coal prices

HUMAN TORPEDO: *The "human torpedo," like that used by the British Navy in an attack on shipping at Palermo before the fall of Sicily, is shown here being lowered into the water. Manned by a crew of two, it is driven by electric batteries to a point where the warhead of the torpedo is released. The crew then rides away from the target area. The silhouette is so low in the water that it is difficult to detect.*

That is a pledge—made by Ordnance Packaging Sections, by manufacturers of materiel, and by the makers of corrosion preventives. They shall not rust!

Houghton's anti-corrosion record covers three wars. In this greatest of all wars, extending from arctic climes to desert and jungle heat, rust preventives have a global job. They *must* so protect closely machined and finely finished steel parts, that, when unpacked, the equipment shall be ready for instant use.

That is a responsibility. We accept our share of it, and will continue to supply corrosion preventives that meet—and exceed—government specifications. For a list of these products, or for helpful data on any "spec" you may have to meet, ask The Houghton Man, or write us direct.

E. F. HOUGHTON & CO., 303 W. LEHIGH AVE., PHILA.

Houghton's RUST Preventives

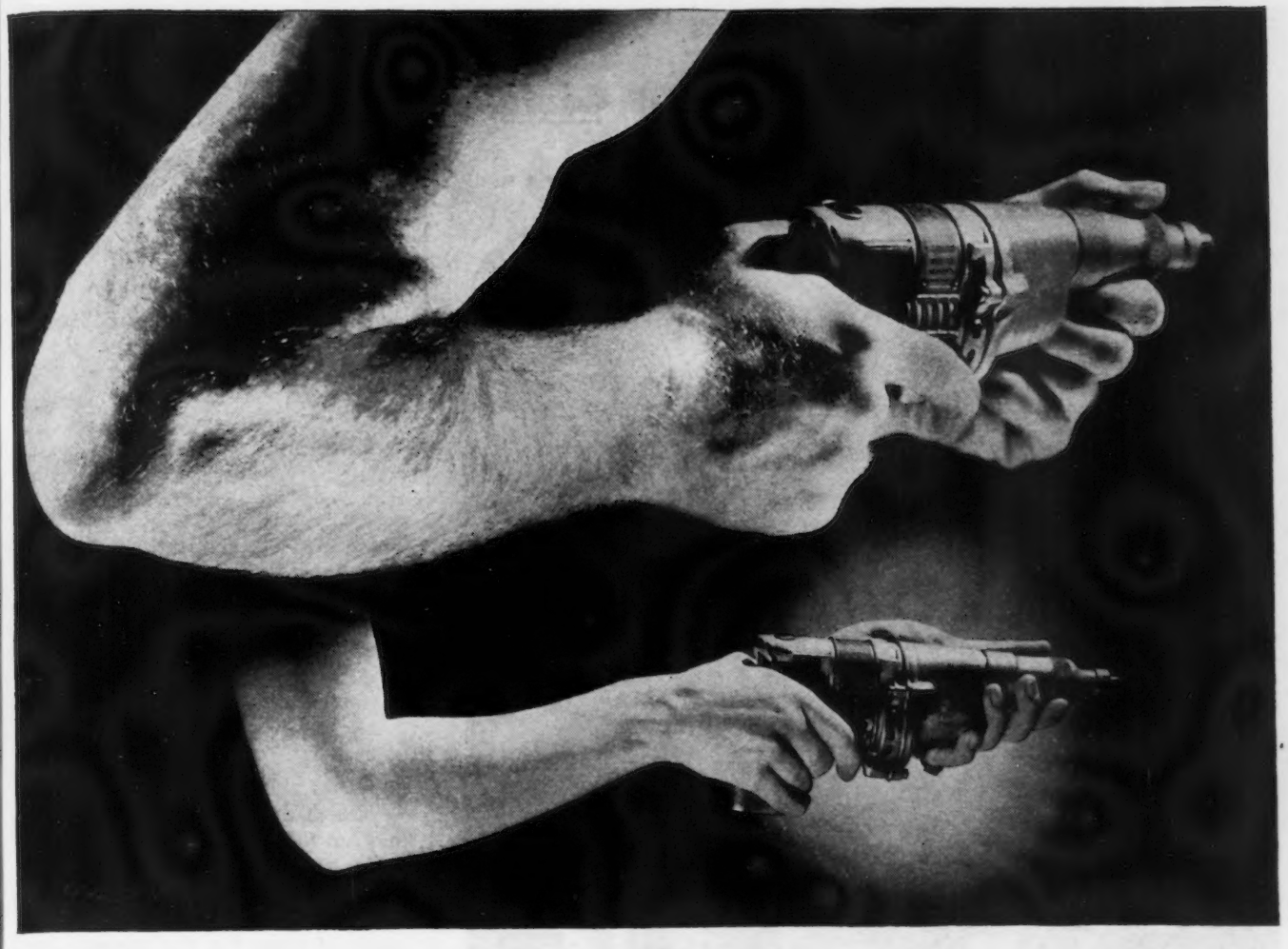
is taken, is revealed by a recent statement of Mr. John Brown, general secretary of the Iron and Steel Trades Confederation, the trade union of the iron and steel industry. It is certain, Mr. Brown said, that the iron and steel industry cannot carry any further increase in the cost of fuel if it is to remain an effective competitor for world trade after the war. Fortunately, the need for raising the productivity of the coal mining industry as a means of combining reasonable wages with reasonable coal prices is realized.

Mill practice is another, but scarcely less important, problem. The British steel industry has never lacked capable scientists or high technical skill. Its best plants compare favorably with those of other countries, but the average could well be advanced. Here the problem is to get a balanced capacity in harmony with the size and nature of the market, with the emphasis on finished products of high quality. There will still be need for bulk products; but on the export market, quality products may offer the best opportunities for British steelmakers.

It is largely a matter, within the limits of demand, to keep abreast of the scientists in the application of new ideas, new methods and practices. Although the industry made much headway in the 1930's it has been hampered by excessive conservatism in the matter of capital expenditure on new plant facilities. In the 1920's conservatism was reinforced by the lack of funds; in the 1930's, which brought a tariff and fixed prices, it was encouraged by a feeling of security.

Since the outbreak of war, however, the industry has shown great resilience in the face of difficulties, and a high degree of technical efficiency as, for example, in producing the special steels needed for munitions. There is now a progressive outlook, with its consequent readiness to adopt new ideas. This, with adequate financial resources, should insure that British steel mill practice will not lag. There are no indications that the industry will rely on a monopoly of the home market, which, obviously, would spell stagnation.

The British investor, in demanding a slightly higher return on the money he puts into steel shares, is merely exercising a measure of caution. The price of steel shares, in sum, reflect the special problems the industry will have to overcome after the war.



Compare The Effortless Ease

with which CLUTCH HEAD Screws are driven home . . . *employing the substitution of method for muscle* . . . with definite output gain at the end of the day. The explanation is simple. With the straight-walled Clutch recess, matched by the straight sides of the Type "A" Bit, there is no "ride-out" tendency and, therefore, no need for strenuous end pressure. This exclusive CLUTCH HEAD feature eliminates the fatigue factor set up by end pressure. In addition, the wide Clutch of this modern screw develops speed and confidence in line assembly work by presenting a safe, easy-to-hit target.

CLUTCH HEAD *contributes so many outstanding exclusive advantages for faster, better, safer, and lower cost production that it has come to be accepted as* "The Screw That Sells Itself." *You may demonstrate this to your own satisfaction by asking us* to mail you *package assortment of* CLUTCH HEAD *Screws and sample of the Type "A" Bit.*

The fact that CLUTCH HEAD Screws operate with the ordinary type screwdriver simplifies problems of field service. This feature has proved its value in many phases of the war effort. This modern screw is available in Standard and Thread-forming types for every purpose.

CLUTCH HEAD · SCREWS ·

This rugged Type "A" Bit delivers long uninterrupted service. A brief application of the end surface to a grinding wheel restores original efficiency. No delay, and no "back-to-the-factory" shipment for reconditioning.

UNITED SCREW AND BOLT CORPORATION

CHICAGO CLEVELAND NEW YORK

Batt, SKF Head, Labels Enemy Aid Charges "Scurrilous"

Philadelphia

• • • **In an attempt to** put an end to "scurrilous" and "irresponsible" reports that SKF Industries, Inc., is supplying the enemy with ball bearings, William L. Batt, vice-chairman of the WPB and president of SKF, addressed a meeting of his employees on May 17.

"Some of you have been told that some of the bearings made here go to the Nazis," Batt said. "Others that you are working for a Nazi controlled company. No reputable newspaper, in fact no newspaper at all, has made such assertions. They come from irresponsible sources.

"I can assure," Batt continued, "that there are no Germans in this company and that we are as anxious as you to keep Germans out of it. The bearings you made are going 100 per cent to war work, critical war work, and there is no export of bearings not fully controlled by the United States Government and very few exported. You could turn out total American ball bearings exports in a couple of hours but this company has nothing to do with where those exports go. That is decided by government agencies.

"If anyone tells you that any bearings made by this company go to enemy countries, you can put him down as either a malicious liar or as an ignorant man.

"Nobody could be more happy over these rumors than Hitler and you are

Index of Foundry Equipment Orders April, 1944

Source: Foundry Equipment Manufacturers Association

1943	New Equipment	Repairs	Total Sales
April	297.7	558.7	362.7
May	274.3	573.7	348.9
June	355.6	609.2	413.6
July	320.9	577.0	379.4
August	341.0	556.9	390.4
September	268.7	621.0	346.6
October	375.7	650.9	436.6
November	328.0	600.3	388.0
December	396.5	605.4	442.8
1944			
January	321.6	577.5	378.3
February	402.6	648.2	456.8
March	457.6	642.6	498.4
April	322.2	610.1	385.7

31 companies reporting

NOTE: The foregoing figures are per cent of the 100 per cent base (monthly average) of reported sales to metal working industries during 1937-38-39. A practical comparison of figures on the old base (1922-23-24 figures) can be determined by multiplying new base figures by 1.328.

A BIG IMPROVEMENT HAS BEEN MADE

. . . . Wherever A-c Brakes are needed!

On Cranes, Hoists, and Machinery . . . these EC&M Type WB Brakes give HIGH-SPEED PERFORMANCE -REDUCED UP-KEEP

BY the addition of a compact rectifier-unit — available for separate mounting, as shown above, or combined with the motor control panel— you can now have as smooth, quick-acting and efficient brake performance on a-c motors as experienced for years on d-c motors.

These brakes not only eliminate the laminated members required in a-c brake design, but give quick response. High initial current insures *fast release;* automatic reduction of the holding current results in *fast setting.*

Many hundreds of these brakes are already in successful operation. Write today for new Bulletin 1006 on EC&M brakes for a-c operation.

Send for Bulletin 1006 for A-c;
Bulletin 1004-D for D-c.

OUTSTANDING FEATURES OF OPERATION

No laminated magnets or plungers.
No destructive hammer-blow.
No a-c chatter.
No coil burn-out due to shoe-wear affecting air-gap.
No motors, gears or pumps.
Has fast release and fast set.
Has ability to permit accurate inching.
Has hand release.
Has solid cast-steel magnet and armature.
Has short armature-movement.
Has thick, moulded brake blocks— 1/4" to 3/4" thick.

THE ELECTRIC CONTROLLER & MFG. COMPANY
2698 EAST 79TH STREET CLEVELAND 4, OHIO

helping Hitler if you don't boost production. This is an American company operated by American people."

On May 16, the Treasury Department and the Alien Property Custodian announced that the Philadelphia and New York subsidiaries of SKF had excellent war production records and would not be seized by the government.

"The Army and Navy," the report said, "have advised that all production of the corporation has contributed to the war effort of the United States and the other united and associated nations and that such production is vital to the war effort."

Continental Forms Unit To Handle Foreign Business

New York

• • • **Continental Can Co.** has formed a subsidiary, Continental Overseas Corp., to act as an agent and representative for the parent company and subsidiaries. The new corporation will handle business in all foreign countries except Canada and Cuba. Officers are Carle C. Conway, president; S. McKewen, vice-president and general manager; P. E. Pearson, W. H. Funderburg, and J. F. Egenolf, vice-presidents; L. R. Dodson, secretary, and E. W. Gray, treasurer.

Mr. Conway, who also is president and chairman of the board of the parent company, said that the subsidiary will handle the export and licensing of metal containers, machinery, paper and fiber containers, plastics, crown caps and other products of the concern to foreign countries, and generally will supervise relationships of the organization with its associate companies overseas.

Screw Machine Capacity Located Under New Service

• • • **Due to the many** requests for assistance in locating available machine capacity, the National Screw Machine Products Association has set up a clearing house for such requests. All member companies are reporting machine capacity presently available and capacity expected to be available in the near future.

This service is provided free to buyers of screw machine products. Inquiries should be addressed to Dept. K, National Screw Machine Products Association, 13210 Shaker Square, Cleveland 20.

It's the "little" things . . . The successful completion of today's *big* war projects depend on "little" things . . . Like rugged floors that withstand punishing hours of wear . . . Safe floors that prevent costly falling accidents. "A.W." Rolled Steel Floor Plate can be cut and installed almost overnight without disturbing production. Illustrated is the "A.W." Super-Diamond Pattern which resists slipping in *any* direction. Oil-proof, heat-proof, fire-proof, crack-proof. Write for folder.

Other products include Plates, Sheets, Billets, Blooms, Slabs—Carbon, Copper or Alloy analyses.

ALAN WOOD STEEL COMPANY

MAIN OFFICE AND MILLS: CONSHOHOCKEN, PENNSYLVANIA : SINCE 1826. District Offices and Representatives: Philadelphia, New York, Boston, Atlanta, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Houston, St. Paul, New Orleans, Pittsburgh, Roanoke, Sanford, N.C., St. Louis, Los Angeles, San Francisco, Seattle, Montreal

Fears of Warehouses About Surplus and Idle Steel Stocks Diminish

Chicago

• • • **Local warehouses** are noticeably less fearful of potential adverse effects of large stocks of surplus steel during and after the war than they were six months ago.

Possibly the principal factor in this more cheerful spirit is the realization that even though large amounts of steel by value may be released as a result of contract terminations and for other reasons, a large portion of this steel is specification material not adaptable to normal uses. Last fall, for instance, large quantities of narrow cold rolled strip, originally rolled upon the specifications of cartridge clip manufacturers, were released by contract termination. Normal experience indicated that only small quantities of this material would find a use for years to come, and after the appetite of normal distribution channels was satisfied, most of the remainder found its way back to the steel furnaces. In another case, a large quantity of tool steel held by a midwestern ordnance district was coldly regarded by possible buyers because of the improbability of ever being able to dispose of it in normal trade transactions.

Although even the Aircraft Scheduling Unit says it does not know the exact amount of supposedly large stocks of surplus material held by plane builders, the trade displays no great uneasiness for the reason that it is now generally conceded that much of this material will be unsuitable for any other use than that for which it was originally intended.

Viewers-with-alarm, who recall the period following World War I in which surplus stocks, acquired by brokers for a song, seriously undermined the market for several years, are offset by those who hold that the more specialized types of steels now generally prevalent militate against a recurrence of that unfavorable situation. Following broad cancellation of tank contracts last year, secondary dealers began to offer plates for sale in a market in which that item was virtually unobtainable. However, when initial buyers found that the "plates" were in reality armor and impossible to fabricate with normal equipment, the potential market vanished.

The current government policy of

MADE TO BE TOSSED OVERBOARD

IN those fateful days when our cargo ships were the daily prey of Nazi subs, old-type life boats couldn't meet the new demands for speedy launching and safety. The Merchant Marine needed a new boat; one that could be put into the water quicker . . . much quicker. So they designed a boat to be simply thrown overboard. It was like a double-sided raft; either side that bobbed up after its dive from the deck was the "right" side. They built it of wood, but wood wasn't strong enough. Then they built it of steel.

Much credit for the success of the Kokomo life raft goes to The Globe-American Corporation, its manufacturer. But we at Continental are proud to supply the steel for its production, and are pleased that our regular Superior Galvanized sheet could meet its difficult requirements. Said Mr. A. P. Chester of Globe-American, "We tried other galvanized sheets but found that Continental's met the forming requirements particularly well and still held their zinc coating."

The specialized properties of Continental steel sheets may be of value in your products, present or future. Write for additional information.

CONTINENTAL STEEL CORPORATION . . KOKOMO, INDIANA

CONTINENTAL STEEL CORPORATION ★ SUPERIOR STEEL SHEETS

CONTINENTAL SUPERIOR STEEL

SUPERIOR

CONTINENTAL STEEL CORPORATION

PRODUCERS OF STEEL SHEETS, MANUFACTURER'S WIRE AND CHAIN LINK FENCE

seeking rapid disposal of material following termination of contracts generally is meeting with trade approval. In this way, standard items are flowing into a more or less insatiable market, thus being removed as a potential Damoclean sword hanging over the future. Some officials expect that even immediately following the end of the war there will be eager buyers for immediate delivery of all surplus standard items which are available as well as those rolled by the mills.

One sour note has been sounded as a result of apparently poor circularization of potential buyers by the services. Some of the largest warehouse outlets claim that they have been unaware of the existence of certain surplus stocks, or that disposal by the services was to take place, until the sale had been consummated with other buyers. Unless this situation is remedied, disposal branches of the services will inevitably lay themselves open to charges of favoritism with potential ugly repercussions.

New Methods for Allocation Of Surplus Aircraft Materials

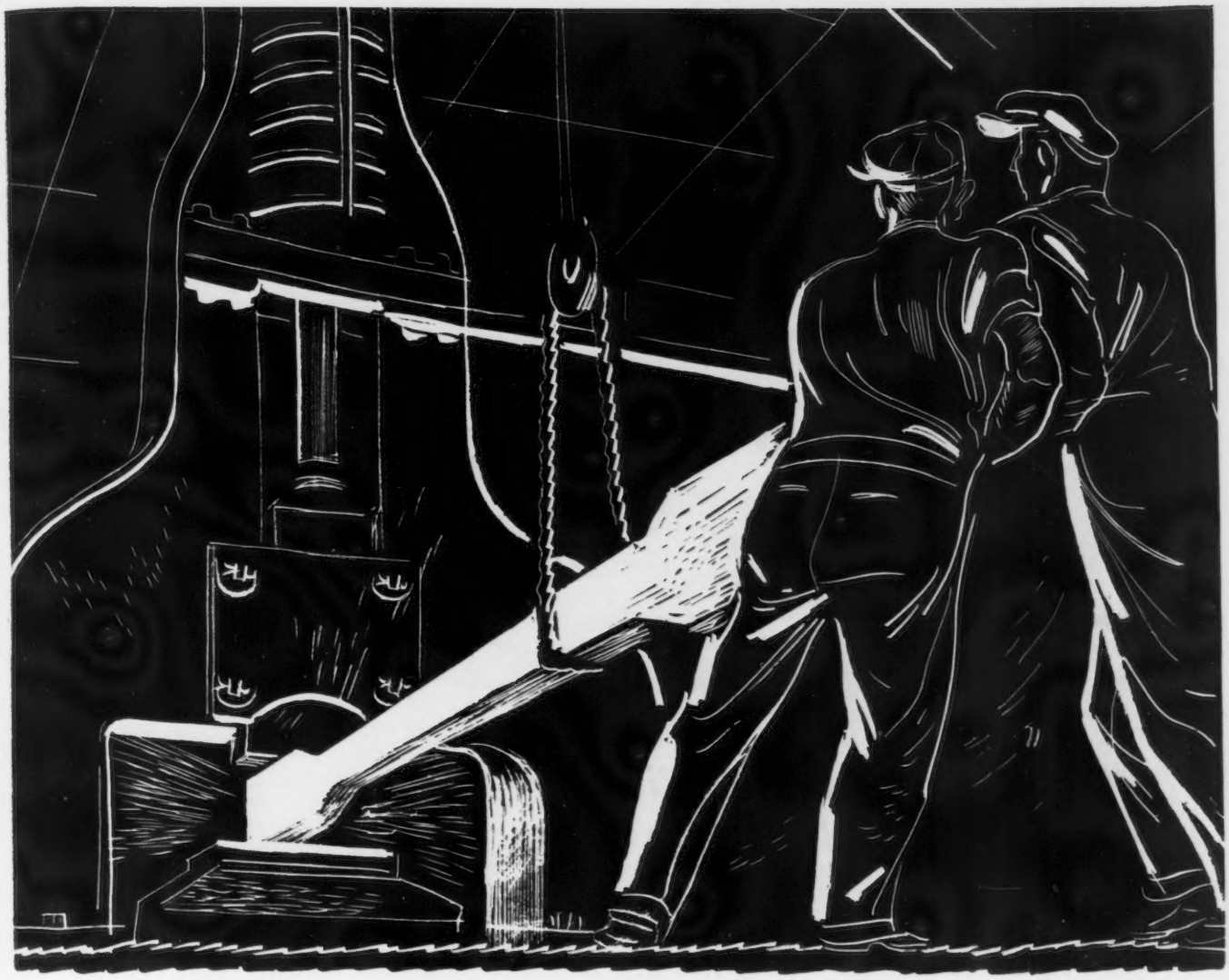
Washington

• • • **Jesse H. Jones**, Secretary of Commerce, announced that Metals Reserve Co., a subsidiary of RFC, has reached an understanding with the Aircraft Scheduling Unit of the Army Air Forces and Navy Bureau of Aeronautics, providing new methods for redistribution of usable surplus aircraft material now held in plants of manufacturers.

As soon as MRC is furnished with an inventory of such material, it will contract with commercial distribution warehouses throughout the United States to have them sell these materials.

Other references to warehouses serving as distributors for excess aircraft steels appeared in THE IRON AGE, *March 23, page 103, and April 20, page 138.*

Surplus aircraft material has been accumulating at some plants as a result of changes in plans but can be used by other plants if made available for essential civilian purposes at a time when there is a great demand. Putting this material to use will ease labor shortages in areas where such material is produced and decrease the amount of surplus that will ultimately have to be disposed of.



A CONSISTENT SOURCE OF SUPPLY

When George Washington was elected President of United States for the second time, Standard Steel Works, as "Freedom Forge", started on its historic career of service to American industry. Through war emergencies and commercial depressions this company has produced quality steel products for railroads, marine service and general industry. The traditions of this 149-year-old organization give its personnel a wealth of experience and a sense of responsibility that are reflected in the quality of its products. THE BALDWIN LOCOMOTIVE WORKS, STANDARD STEEL WORKS DIVISION, BURNHAM, PA., U. S. A. DISTRICT OFFICES: Philadelphia, New York, Washington, Boston, Cleveland, Chicago, St. Louis, Houston, San Francisco.

BALDWIN PRODUCTS

Hydraulic presses, Testing equipment, Steel forgings and castings, Diesel electric locomotives, Diesel engines, Metal plate fabrication, Rolled steel rings, Bronze castings, Heavy machine work, Crane wheels, Bending rolls, Plate planers, Babbitt metal, Alloy iron castings, Briquetting presses

ARMY E NAVY

BLW THE BALDWIN GROUP

BALDWIN
STANDARD
STEEL FORGINGS & CASTINGS

Surpluses Are Now Of Grave Concern, Says Raw Materials Board

Washington

• • • **The Combined Raw Materials Board** recently published its second annual report covering the year ended January 26, 1944. In general, the report reflects easier going during 1943 than in the preceding year and indicates, the board said, that the raw materials battle has been largely won. The wealth of resources available to the United Nations, their control of the shipping lanes, and the early institution of combined planning on an international basis have made this possible, the board said.

The report affords evidence of the dependence of both Great Britain and the United States on foreign sources of raw materials. "In this war," the report said, "neither Great Britain nor the United States could have maintained its enormous war program without drawing supplies of raw materials on an impressive scale from overseas." While some commodities remained critically short throughout 1943, the report stated that no serious injury to the war effort had resulted from shortages of materials.

Broadly speaking, "the policy of the board during 1943 has been to con-

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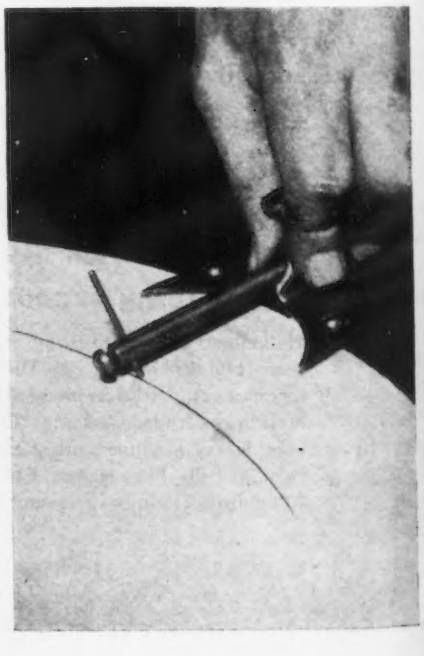
SIMPLE GADGET: *For scribing circular parts without center sections, General Electric employees use this radial scratch gage. It consists of a flat plate with two guide pins underneath and a center piece on top that holds a slide arm. The scriber, at the end of the slide arm, can be adjusted.*



centrate its attention on those materials . . . which were actually or potentially in scarce supply during 1942 and which continued to demand action on a combined basis for their effective solution," the report states.

In connection with the easing of the raw materials position, the board indicated that by the end of 1943 it was beginning to be concerned with problems arising from surpluses.

Where available supplies become more than adequate to meet requirements for currently permitted uses, balance can be achieved by (a) reducing output, (b) consuming more, and (c) additional stockpiling. "Availability of adequate quantities of any given material does not of itself permit general relaxation" (of controls), the board warned. Other limiting factors, such as manpower shortages, fuel, plant capacity, and shipping, must also be taken into account.

The board also pointed out that since the degree of surplus developing in some commodities cannot be fixed with complete certainty at this stage, care must be taken to insure that sudden reductions in production shall not result in deficits later on. In general, the supply position for most commodities now under allocation or review by the board will require some measure of supervision or control until the end of the war.

Although in the view of the board no general relaxation is yet possible, it was admitted that more lenient consumption policies could for the time being be justified by the easier position in some raw materials provided no other limiting factor arises.

Additional Surplus Disposal Offices Shown

• • • **Another listing** of disposal offices for certain types of surplus materials are shown here. Each office listed is keyed to indicate the mode of sale and broad classification of goods offered for sale.

Other lists of disposal offices for surpluses of war materials were shown in THE IRON AGE, March 30, page 92; April 6, page 142; and April 20, page 144.

This key is as follows:

Goods sold are:

(NR) Non-repairable property
(SM) Surplus serviceable military and miscellaneous property
(SI) Serviceable industrial property

Sales are arranged by:

(OB) Offerings and bids
(A) Auctions
(N) Direct negotiations

NEW LUBRICANT *Reduces Rejects*

Sun Tableway Lubricant

Eliminates Stick and Chatter . . . Helps to Hold .0001" Limits

Here is a new lubricant especially developed to put an end to the sticking, chattering and "floating" of tableways and crossslides on machine tools. The outstanding success of Sun Tableway Lubricant is amply proved by the records it is setting in the leading shops of America—making possible the control of accuracy, perfect finish and reduction of rejects. Here is one example . . .

Sticky tableways wasted time and money in the plant of a large Mid-West machine tool manufacturer. It was almost impossible for them to hold close tolerances because of the chattering and sluggish tableways. Result . . . a high percentage of rejects! Poor lubrication was the cause of the trouble. And every piece scrapped cost more than a whole year's supply of the proper lubricant for the job.

Lubricant change cut rejects to a new low. After three months of careful checking Sun Tableway Lubricant, it was found that rejects due to faulty operation of tableways had been eliminated completely, saving much more than the cost of the lubricant and may run into thousands of dollars annually.

You can profit by using Sun Tableway Lubricant. It has good metal wetting and adhesive properties which eliminate chatter and scoring of tableways . . . resists corrosion . . . and remains on ways while table is at rest.

Save and Serve Plan with proper lubrication covers information on all kinds of lubrication problems. It includes lubrication handbook, maintenance wall chart, technical bulletins, case history folders, posters, etc. This material is yours for the asking. Write for folder giving complete details.

SUN OIL COMPANY • Philadelphia 3, Pa.

Sponsors of the Sunoco News Voice of the Air—Lowell Thomas

SUN INDUSTRIAL PRODUCTS

HELPING INDUSTRY HELP AMERICA

NEWS OF INDUSTRY

(L) Aid in locating industrial property

Naval Training Schools,
Navy Pier, Chicago
Telephone: Whitehall 5160—Ext. 140
Att.: Comdr. C. G. Grimes, Supply Officer
(NR-SM-OB)

Salvage Officer,
Camp Polk, La.
Telephone: Camp Polk 2611—Ext. 1177
Att.: Capt. Ralph E. Ashby, Salvage Officer
(NR-OB)

Salvage Officer,
Camp Van Dorn, Miss.
Telephone: Ext. 438
Att.: Joseph Payette, 1st Lt., QMC
(NR-SM-OB-N)

Office of Director, Supply Division,
Camp Crowder, Mo.
Telephone: 450
Att.: J. A. Carroll, Major, QMC, Salvage Officer
(NR-OB)

Post Salvage Office,
Fort Sill, Okla.
Telephone: Ext. 3101
Att.: Maj. George E. Morgenstern, Post Salvage Officer
(NR-SM-SI-OB-N)

Schenectady ASF Depot,
Schenectady
Telephone: 4-2281—Ext. 66
Att.: F. S. Fischer, 2d Lt., QMC, Salvage Officer
(NR-SM-SI-OB)

WAR DEPT. MISCELLANEOUS

(a) *Service Commands*

(Communications should be addressed to the Commanding General, Attention: Salvage Officer)

3rd Service Command,*
Baltimore, Md.

4th Service Command,*
Atlanta, Ga.

5th Service Command,*
Ft. Hayes, Columbus, Ohio

7th Service Command,*
Omaha, Neb.

9th Service Command,*
Ft. Douglas, Utah

(b) *Signal Corps*

Redistribution and Salvage Officer,
Philadelphia Procurement District,
5000 Wissahickon Avenue,
Philadelphia.

Redistribution and Salvage Officer,
Monmouth Procurement District,
Bradley Beach, N. J.

Redistribution and Salvage Officer,
Wright Field Signal Corps Procurement District,
Barlow Building,
Dayton, Ohio.

(c) *Quartermaster Corps*

Redistribution and Salvage Officer,
Philadelphia Quartermaster Depot,
2800 South 20th Street,
Philadelphia.

Redistribution and Salvage Officer,
Jersey City Quartermaster Depot,
26 Exchange Place,
Jersey City, N. J.

Redistribution and Salvage Officer,
Jeffersonville Quartermaster Depot,
Tenth Street and Meigs Avenue,
Jeffersonville, Ind.

Redistribution and Salvage Officer,
Washington Quartermaster Depot,

*Salvaged materials chiefly.

TO MANUFACTURERS

whose postwar plans call for long runs of a given part

You will want your after-war parts sources to have:

The ability and skill to work to close tolerances.

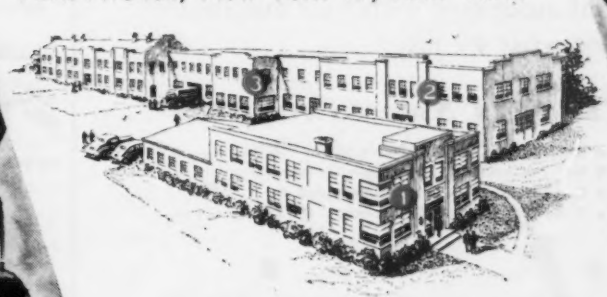
An efficient setup for uniform production of long runs.

Capacity and reliability to insure prompt deliveries.

Experience in adapting new skills and new materials to your parts needs.

Whether your production plans call for forgings, castings or plastics, we believe that Brake Shoe plants plus Brake Shoe Research can be of practical assistance.

If this interests you, write R. B. Parker, American Brake Shoe Company, 230 Park Avenue, New York 17, New York.



BRAKE SHOE'S RESEARCH GROUP

1. Engineering Laboratory 2. Metallurgical Laboratory
3. Experimental Foundry

AMERICAN **Brake Shoe** COMPANY

A parts source that may help you meet postwar competition

59 PLANTS SERVING INDUSTRY AND TRANSPORTATION

American Brakeblok Division	Detroit, Mich.
Ramapo Ajax Division	New York City
American Manganese Steel Division	Chicago Heights, Ill.
Brake Shoe and Castings Division	New York City
Kellogg Division	Rochester, N. Y.
American Forge Division	Chicago, Ill.
Southern Wheel Division	New York City
National Bearing Metals Corp.	St. Louis, Mo.
Electro-Alloys Company	Elyria, Ohio

24th and M Streets, N. W.,
Washington, D. C.
Redistribution and Salvage Officer,
Richmond Quartermaster Depot,
Richmond, Va.
Redistribution and Salvage Officer,
California Quartermaster Depot,
Clay and 15th Streets,
Oakland, Cal.
Redistribution and Salvage Officer,
Seattle Quartermaster Depot,
4735 East Marginal Way,
Seattle, Wash.
Redistribution and Salvage Officer,
San Antonio Quartermaster Depot,
Fort Sam Houston, Texas.
Redistribution and Salvage Officer,
Army Service Forces, Quartermaster Depot,
1819 West Pershing Road,
Chicago.
Telephone: Lafayette 5500—Ext. 272.

(*d*) *Arsenals*

(Address the Redistribution and Salvage Officer at:)

Frankford Arsenal,
Philadelphia.
Picatimy Arsenal,
Dover, N. J.
Red Stone Arsenal,
Huntsville, Ala.
Rock Island Arsenal,
Rock Island, Ill.
Rocky Mountain Arsenal,
Denver, Colo.
Watertown Arsenal,
Watertown, Mass.
Watervliet Arsenal,
Watervliet, N. Y.

(*e*) *Chemical Warfare Service*

Redistribution and Salvage Officer,
Dallas CW Procurement District,
Mercantile Bank Building,
106 Ervay Street,
Dallas, Texas.
Redistribution and Salvage Officer,
San Francisco CW Procurement District,

PRESIDENTIAL VISIT: ***Philip Murray, CIO head (left) and Henry J. Kaiser (right) called at the White House recently to discuss postwar plans for labor and industry. Murray explained that Kaiser's postwar plans for speeding postwar industry were laid before the President.***

Room 201, 1355 Market Street,
San Francisco, Cal.
Redistribution and Salvage Officer,
Rocky Mountain Arsenal,
4th Floor, Cooper Building,
17th & Curtis Streets,
Denver.
Redistribution and Salvage Officer,
Chicago CW Procurement District,
Room 1506, Civic Opera Building,
20 North Wacker Drive,
Chicago.
Redistribution and Salvage Officer,
Edgewood Arsenal,
Edgewood, Md.
Redistribution and Salvage Officer,
Atlanta Sub-Office,
Dallas CW Procurement District,
430 West Peachtree Street, N. W.,
Atlanta, Ga.

(f) *Others*

Redistribution and Salvage Officer,
Tank-Automotive Center,
Union Guardian Building,
Detroit, Mich.
Redistribution and Salvage Officer,
Small Arms Ammunition Sub-Office,
Ayer Building,
Philadelphia.

(g) *Army Air Forces*

Redistribution Offices
Aircraft Scheduling Unit,
Wright Field, Dayton, Ohio,
Major Albert M. Baehr, Chief, Materials Redistribution Branch.
Lt. Fred G. Addis, Surplus Stock Register Unit.
Capt. F. Hitchiner, Warehouse Unit.
Lt. James Fulton, Sales Unit.
District Redistribution and Salvage Officer,
Eastern Procurement District Office,
AAF Materiel Command,
67 Board Street,
New York.
District Redistribution and Salvage Officer,
Southern Procurement District Office,
AAF Materiel Command,
8694 Edgewood Street,
Atlanta, Ga.
District Redistribution and Salvage Officer,
Central Procurement District Office,
AAF Materiel Command,
8505 W. Warren Avenue,
Detroit.
District Redistribution and Salvage Officer,
Western Procurement Office,
AAF Materiel Command,
3636 Beverly Boulevard,
Los Angeles.

Unique Dictionary Developed

• • • **Recognizing the** important part that transportation will play in the industrial development of postwar China, the Marmon-Herrington Co., Indianapolis, is underwriting the preparation of an English-Chinese automotive dictionary. The book lists nearly 10,000 automotive and related terms and phrases, with their Chinese equivalents. It is expected to prove helpful to military forces now operating in China, and later in the reconstruction period.

FROM AN ORIGINAL DRAWING AND SKETCHES BY ORISON MACPHERSON, AT J&L OTIS WORKS

THE OPEN HEARTHS

Bigger than 8-room house, a modern open hearth steel furnace, enclosed in silica brick, produces 150 to 200 tons of molten steel every 10 to 12 hours. The furnace is first charged with limestone, then scrap iron, eventually pig iron or molten iron, and other ingredients. For hours the "bath" melts, bubbling and boiling at temperatures up to 3,000°F., is worked, watched and tested by skilled crews, vigilant to maintain control of quality.

Samples of the steel bath are taken at intervals and laboratory tested to make sure analysis of the steel is correct for the job it is to perform—perhaps on a far away battle front. Experienced open-hearth melters and helpers, by merely looking at a fractured steel sample, can judge carbon content to within 2/100 of 1%. In this they are now assisted by a magnetic device in a small box which reveals carbon content on a dial. This is the "Carbanalyzer," a J&L invention.

Through tap hole in rear wall the "heat" of molten metal is drawn off into great ladles in pits below. As these are filled, protectively garbed skilled workmen on the tapping platforms amidst heat and sparks, throw in measured quantities of manganese, silicon and other final modifying ingredients (see illustration) to obtain exact analysis of steel desired.

Wispy vapors tinted lavender, chartreuse, pink, blue, yellow, arise as the fiery stream of steel gurgles and splashes until ladle is full, and steel sparks shower about, popping and bouncing as they hit the ground. Overhead crane now picks up the sputtering brimful ladle and bears it away to fill the rows of ingot molds standing close by on low-built buggies (small flatcars).

Greatest steel producers of all time, open hearth furnaces, from which streamed last year in the U. S. 78,625,857 tons of steel ingots, were invented by Charles William Siemens, of Hanover, Germany, who became citizen of England to obtain protection of its patent laws. He patented his furnace in 1861 and perfected it in 1867, a dozen years after Henry Bessemer's process had revolutionized steel making.

Two brothers in France, Emil and Pierre Martin, experimenting in the 60's to further improve steel-making methods, utilized a Siemens furnace to produce steel by melting scrap iron in bath of molten pig iron. This became known as the Siemens-Martin process; is substantially the process used today.

A Cleveland ironmaster, Charles A. Otis, founder of Otis Steel Co., in association with Samuel F. Wellman, engineer, of New York, in 1873 built first complete steel works in U. S. planned exclusively for production of steel by the acid open hearth process. In 1880 Wellman built for Otis first basic open hearth steel furnace in U. S. (Basic differs from acid process.) Otis Works, Cleveland is now one of Jones & Laughlin's big steel plants—others are in Pittsburgh and Aliquippa, Pa.

Committee Recommended To Handle Disposal Of Surplus Machines

Washington

• • • **The Used Equipment** and Machinery Industry Advisory Committee has recommended that a joint committee composed of manufacturers, dealers, and government representatives be established to advise on the disposition of surplus machinery and equipment. The committee pointed out that through the operations of such a group, expert knowledge would be available to the government in order that it might get the maximum benefit out of its holdings and insure protection of the domestic economy.

In support of the suggestion, committee members said the group's knowledge of machinery and equipment would enable it to make rapid, accurate and complete descriptions of property, which service would be rendered at no cost to the government. Such property descriptions would effect broad economies in disposing of surplus goods and eliminate the need for large clerical and appraisal staffs to carry on such work. Furthermore, descriptions that are properly drawn would serve to interest a maximum number of possible buyers in the products that are for sale. At the present time, inadequate descriptions tend to eliminate some possible purchasers from the market for surplus items.

Release of materials should be made through established trade channels, the committee members said. Once they were released, dealers' knowledge of markets would prove invaluable in bringing about disposal of goods.

Industry members of the committee urged that sealed bids and auction sale procedures be avoided whenever possible if maximum returns are to be realized and the domestic economy is to be protected.

The committee members agreed that before government owned surplus plants are dismantled every effort should be made to fit them into postwar production either in their present or other localities. Generally, sales of such plants to foreign buyers would be opposed, because by proper development and adaptation, these plants can be made to serve the national interest by providing postwar employment and producing useful commodities.

IS ALWAYS OPEN TO YOUR EMERGENCY NEED

AS WELL AS REGULAR REQUIREMENTS

This is a restatement of a policy. There is nothing new about it. Yet the importance of emergency service on ferro-alloys is of great value particularly during essential wartime demand. Ohio Ferro-Alloys adherence to the meeting of rush requirements but with few exceptions due to unusual conditions, has served to overcome shut-downs or probable reduced operations and helped for immediate development needs. That's the way the Ohio Ferro-Alloys Corporation is known—a dependable source plus helpful service with a "production man's" interest and experience.

PHILO BRAND — DEPENDABILITY · QUALITY · SERVICE

RAINIER BRAND — DEPENDABILITY · QUALITY · SERVICE

Ohio Ferro-Alloys Corporation

Canton, Ohio

Chicago Detroit Pittsburgh San Francisco Tacoma

FERRO-SILICON 50%, 75%, 85%, 90%

FERRO-CHROMIUM • FERRO-MANGANESE

BOROSIL • SIMANAL

BRIQUETS

OFA SILICON, MANGANESE, CHROME

Committee members said that any policy of increasing prices of surplus machinery and equipment to cover storage and maintenance costs would be contrary to normal business practice. They suggested that an automatic declining price scale might better be adopted. Prices for governmental surplus equipment and machinery should be established at a percentage of the price for new machinery, and that at stated periods after the establishment of the original figure, a reduction in the price should be made until a sale has been completed. On slow moving items, they pointed out, the monthly reduction could be large and as a consequence, the goods would tend to move more rapidly. Thus the accumulation of storage charges covering long periods could be eliminated, they said.

Ore Consumption Steady, Stocks Fall Slightly

Cleveland

• • • **Consumption of** Lake Superior iron ore by U. S. furnaces totaled 7,051,576 gross tons in April as compared with 7,426,429 tons the previous month and 6,971,165 tons in April, 1943. Canadian furnaces used 220,990 tons in April, 1944 as against 232,418 tons in March and 215,036 tons in April a year ago. The totals were 7,272,566 tons for April, 1944, 7,658,847 tons for March and 7,186,201 tons for April last year.

Cumulative consumption for 1944 to date is 29,620,408 gross tons of which 28,767,016 tons was U. S. consumption, as contrasted with a total of 29,778,750 gross tons for the same period of 1943 when U. S. furnaces used 28,955,507 gross tons.

Ore on docks in the U. S. on May 1 this year amounted to 2,906,827 gross tons while the amount a month ago was 3,675,078 tons and a year ago was 2,814,990 tons. Stocks at furnaces, both Canadian and U. S., totaled 14,984,974 gross tons on May 1 as compared with 17,657,886 tons on April 1 and 15,681,998 tons on May 1 last year.

There were 173 U. S. and 7 Canadian furnaces in blast on May 1 out of a total of 186 U. S. furnaces and 10 Canadian furnaces. This compares with 177 U. S. and 7 Canadian furnaces in blast a month ago and with 169 U. S. and 9 Canadian furnaces a year ago when 13 U. S. furnaces were idle and all Canadian furnaces were operating.

USES to Handle All Male Employment; Hirings Are Limited

• • • **Paul V. McNutt**, chairman of the War Manpower Commission, recently authorized regional directors to extend the program for directing all male workers to jobs through the United States Employment Service or such channel as USES may designate. This action, he said, will permit a better allocation of available labor.

Up to the present time, such "controlled referral" has been limited to Group I and II areas, in which labor has become very scarce. The extension of these provisions to Group III and IV areas, Mr. McNutt said, is a recognition of the fact that even in areas of more plentiful labor supply, male labor suitable for jobs that can be filled only by men is limited.

Mr. McNutt's action took the form of an amendment to Regulation 7, which governs the employment stabilization program, effective May 22.

Another amendment to Regulation 7 was one intended to strengthen the commission's system of instituting employment ceilings, which limits the number of workers or specified types of workers that may be empoyed in an establishment during specified periods. The expansion of the system of controlled referrals is merely a part of the commission's general program for the stabilization of employment. Manpower priorities, employment ceilings and controlled referral have been adopted in many areas and in some of them all three are in effect. At present manpower priorities committees are operated in 50 areas and employment ceilings have been established in 24. Controlled referral plans of varied types are in effect in 104 areas. The majority of these affect only the employment of men, although some of them apply both to men and women. Some of them relate only to the employment in certain activities, while others cover all employment in essential work.

Gilbert Heads Regional A.F.A.

• • • **J. T. Gilbert**, superintendent of production, Stockham Pipe Fittings Co., has been elected chairman of the Birmingham District Chapter, American Foundrymen's Association. Other new officers are John F. Wakeland, McWane Cast Iron Pipe Co., vice-chairman, and Fred K. Brown, Adams, Rowe & Norman, Inc., secretary-treasurer.

DPC and Army Contract Awards

Washington

• • • **Defense Plant Corp.**, RFC subsidiary, and the Army have authorized the following contracts:

William Sellers & Co., Inc., Philadelphia, to provide equipment at a plant in Philadelphia, at a cost of approximately $100,000.

Bloomfield Mfg. Co., Chicago, to provide equipment at a plant in Chicago, at a cost of approximately $50,000.

Pesco Products Co., Cleveland, to provide additional equipment at a plant in Cleveland at a cost of approximately $70,000, resulting in an overall commitment of about $1,900,000.

Monarch Machine Tool Co., Sidney, Ohio, to provide additional facilities at its plant in Sidney at a cost of approximately $100,000, resulting in an overall commitment of about $730,000.

Mueller Brass Co., Port Huron, Mich., to provide additional equipment at a plant in Port Huron at a cost of approximately $425,000, resulting in an overall commitment of about $1,900,000.

Nash Kelvinator Corp., Detroit, to provide additional plant facilities at Kenosha, Wis., at a cost in excess of $9,500,000, making a total commitment of more than $46,000,000.

Consolidated-Vultee Aircraft Corp., San Diego, Cal., to provide additional plant facilities at New Orleans, at a cost in excess of $800,000, making a total commitment of more than $12,000,000.

Westinghouse Electric & Mfg. Co., Pittsburgh, to provide plant facilities at Lester, Pa., at a cost in excess of $2,600,000.

Woodall Industries, Inc., Detroit, to provide additional equipment at plants in Monroe and Detroit, at a cost in excess of $130,000, making a total commitment of more than $920,000.

Aluminum Industries, Inc., Cincinnati, to provide equipment at a plant in Cincinnati at a cost in excess of $750,000.

The Permold Co., Medina, Ohio, to provide equipment at a plant in Medina, at a cost in excess of $60,000.

Hamilton Field, Cal., authorization for construction of parking apron, including grading, preparation of sub-grade, crushed rock base course and drainage; and reconstruction and extension of the existing night lighting system on the NW-SE runway. The authorized expenditure is $919,000. Work will be supervised by the San Francisco District Office of the Corps of Engineers.

Fairmont Army Air Field, Fairmont, Neb., authorization for additional construction of: Mess hall, hangar, celestial navigation trainer buildings, warehouses, etc.; erection of prefabricated demountable buildings; addition to existing Link trainer building; additional gasoline storage facilities; and minimum essential utilities, roads, and appurtenances. The authorized expenditure is $635,900. Work will be supervised by the Omaha, Neb., District Office of the Corps of Engineers.

Grand Island Army Airfield, Grand Island, Neb., authorization for additional construction of: Lavatories, mess hall, hangar, celestial navigation trainer buildings, Navi-Trainer building, warehouses, recreation building, etc.; erection of prefabricated demountable buildings; additional gasoline storage facilities; and minimum essential utilities, roads, and appurtenances. The authorized expenditure is $608,000. Work will be supervised by the Omaha, Neb., District Office of the Corps of Engineers.

Harvard Army Airfield, Harvard, Neb., authorization for additional construction of: Lavatories, mess hall, hangar, celestial navigation trainer buildings, warehouses, and recreation building; erection of prefabricated demountaable buildings; addition to Link-trainer building; additional gasoline storage facilities, etc.; and minimum essential utilities, roads, and appurtenances. Authorized expenditure is $644,800. Work will be supervised by the Omaha, Neb., District Office of the Corps of Engineers.

Shop Box Racks on Standard Transport—quickly maneuvered when and where needed.

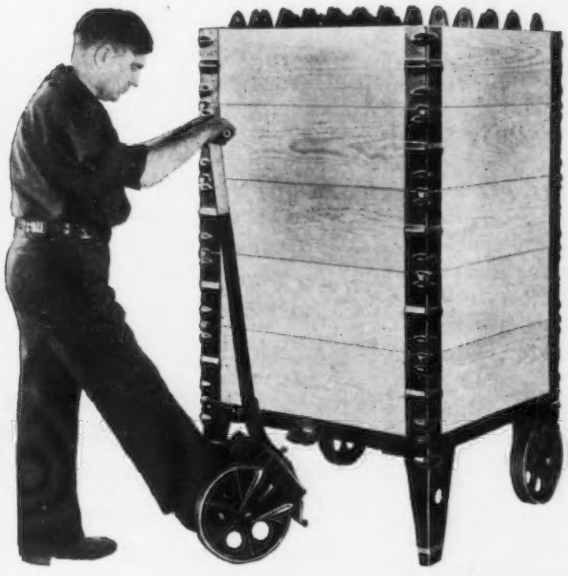
Is it MANPOWER YOU NEED?

WITH THE TURNER SYSTEM OF MATERIALS HANDLING

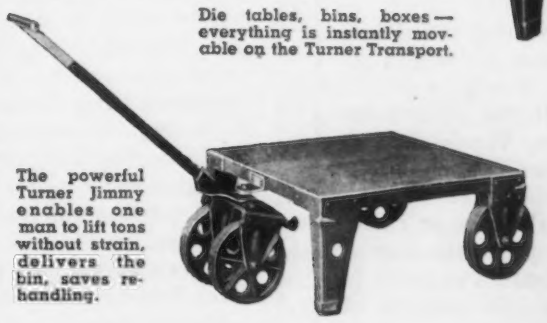
ONE MAN DOES THE WORK OF FOUR

Yes, it's a fact! The Turner System is scientifically engineered to increase manpower with few men! Its vertical expansion scheme saves time and space, speeds production, cuts costs. It completely coordinates all steps in handling materials—with amazing results.

Die tables, bins, boxes—everything is instantly movable on the Turner Transport.



Send for This Book!
A new book on the Turner System shows how one man can do the work of many, describes the entire plan. Sent to established companies.



The powerful Turner Jimmy enables one man to lift tons without strain, delivers the bin, saves re-handling.

Wheeling Shop Box with Bin Sections.

Clip This Coupon — Mail Today

Factory Service Company
4621 N. Twenty-first St.
Milwaukee, Wisconsin

Name ..... Title .....
Firm .....
Address .....
City ..... State .....

FACTORY SERVICE COMPANY

4621 NORTH TWENTY-FIRST STREET MILWAUKEE 9, WISCONSIN

Alloy Steel Output Declines in April

• • • Production of alloy steels during April totaled 889,051 tons, less than 12 per cent of total steel production during that month, according to the American Iron and Steel Institute. In March, 952,287 tons of alloy steel were produced, and in April a year ago alloy steel production was 1,214,965 tons, or 16.5 per cent of total steel output.

Open hearth furnaces produced 581,005 tons of alloy steel in April. The remaining 308,046 tons of alloy steel production came from electric furnaces.

Carbine Sight Made From Brazed Stampings

[CONTINUED FROM PAGE 47]

Fig. 2, made by the Ecco High Frequency Corp., six sights are brazed simultaneously in 40 sec. when drawing about 12 kw. from the line. The six gun sights which make up one charge are lined up by the operator on a guide rod which is notched to keep the pieces at a distance of about 3/32 in. apart and are deposited in the hydrogen chamber by pushing the rod into the chamber, lowering it slightly to disengage it from the work pieces and then withdrawing it. The space between the pieces prevents their brazing together. An automatic electric timer controls the heating cycle. When the next charge is pushed into the chamber, the guide rod pushes the brazed pieces into a water jacketed cooling compartment, also filled with hydrogen. The parts are dropped through a chute into a tank of water which forms a gas seal. The gas is introduced at the end of the cooling chamber and is burned at the entrance to the brazing chamber.

After brazing, the bore of the sight is ball broached to 0.5775 to 0.5785 in. The next operation is drilling and reaming a 0.125 in. cross hole through the guard and saddle, after which the sight is heat treated at 1500-1550 deg. F. and quenched in oil, then tempered to obtain a hardness of Rockwell C-37-45. It is then ball broached again and the cross hole finish reamed. The two ¼ in. diameter holes in the ears were previously pierced in the first press operation on the guard. Final operation is to finish broach the keyway, removing about 0.002 in. of stock, as well as cleaning up any excess copper which may have found its way into the keyway at the time of brazing.

Powder Metallurgists Present Technical Advance

(CONTINUED FROM PAGE 58)

products are being offered. However, if brake linings for automobiles must be made from metal powders after the war, then a cheap copper powder will be a requisite. A solution to this problem might lie in the use of copper concentrates direct from the mines where impurities such as silica would have no deleterious effect, since this compound is added to the copper powder for frictional resistance.

It was pointed out that powder metallurgy as a process actually embodies little metallurgy, but a great deal of ingenious mechanical engineering, as in the design of presses and dies, along with concepts of surface phenomena derived from physics and chemistry. Developments in powder metallurgy will come rapidly as new test methods are devised to increase knowledge in these special situations.

As an example of this, the S. K. Wellman Co. has a large engineering staff devoted to the study of friction as related to problems encountered in the manufacture of brake and clutch facings. Extensive dynamometer testing of frictional properties of metal powders has disclosed many anomalies regarding previous concepts of the coefficient of friction. Such factors as change of speed, pressure, and temperature will vary the coefficient of friction. Testing of frictional properties must always be conducted with materials taken in pairs. Results of dynamometer tests for friction show that if silica is exceedingly fine, it does not increase the coefficient of friction of copper, but acts as a polishing material. Tests also indicate that graphite does not change the coefficient of friction but prevents metal to metal contact. The part played by lubricants in frictional resistance is not yet clear nor is any good test method available for the measurement of heat transfer.

Dr. Wulff ended his paper with a plea for more published data on the fundamental properties of powder metallurgy. He urged that many theoretical problems could be discussed publicly without fear of disclosing trade secrets which are the "know how" of processing in powder metallurgy.

In an address entitled "Technical Requirements of Metal Powders," by Earl Patch, Henry L. Crowley Co., it was stated that metal powders vary so much in regard to depth of fill and

flow characteristics that, in produc tion, as much as 25 per cent of th equipment may be idle waiting fo tests on the characteristics of eac lot of powder. This is a serious con dition which indicates that man factors need to be brought unde manufacturing control. Dimensiona changes of parts in production ar also a critical factor requiring muc time in checking.

In the manufacture of iron parts impurities such as MnO can caus lowered physical properties as we as both absorbed and adsorbed gase

Next on the program was an ad dress on "Aluminum Powders" b Arch Gailbraith of the War Produc tion Board. Some of the possible use for aluminum powder after the wa were as follows: (1) Parts by powde metallurgy, (2) additions to steel, (3 improved paint pigments, (4) addi tions to paper manufacturing, (5 additions to concrete for increase lightness in combination with high strength, (6) use with blow torche where the thermal effects of aluminu may be utilized.

An address entitled "Powder Metal as Viewed by the Army," by Lieut Col. Leo J. Pasternak, Office of Chie of Ordnance, U. S. Army, discusse pyrotechnics and military explosive with magnesium powder as the chie ingredient. Since the advent of th war, production of magnesium powde has expanded six hundred times. The function of pyrotechnics is to emi light for a period of time from a few seconds to a few minutes. To accom plish this purpose, there must be present, fuel, an oxidizing agent, a coloring agent, an intensifier of the color, and a binder of inert material. At present, flares are being produced with a million candle power for a duration of one minute. The particle size of the magnesium powder is re lated to the candle power and may be specified by apparent density tests.

Pyrotechnics must be made mois ture proof so that the magnesium powder and oxidizing agents are sealed in a container. For airplane crews the white light of magnesium is too glaring so colors have been added for protection. In signal flares, colors have been added which have a narrow spectral band to prevent confusion of the signal which has sometimes oc curred even with widely differen colors.

In the afternoon session, a "Stump the Experts" meeting was held with H. Roger Coleman, Metals Disinte grating Co., as master of ceremonies

and the experts as follows: J. E. Drapeau, Metals Refining Co.; John Nurney, S. K. Wellman Co.; Raymond Rosenfield, Metals Selling Corp.; G. J. Brittanham, metallurgist from Australia; and F. H. Clark, Western Union Telegraph Co.

During the questions which ensued, a report was given by Prof. J. Kuzmick of the Powder Metallurgy Laboratory, Stevens Institute of Technology, that certain natural graphites added to iron powder gave medium carbon steels, especially if sintering was carried out in cracked ammonia gas. As an example, a sample of electrolytic iron powder with 1 per cent Ceylon graphite No. 8485 of the Dixon Co., and 5 per cent carbonyl iron powder was pressed at 50 tons per sq. in., sintered 15 min. at 1100 deg. C., coined at 75 tons per sq. in., and resintered 1 hr. at 1100 deg. C. (2012 deg. F.). It was then hardened by quenching in water from 850 deg. C. (1562 deg. F.) and tempered at 320 deg. C. (608 deg. F.). This steel had 0.75 per cent combined carbon, a tensile strength of 150,000 lb. per sq. in., and a hardness of Rockwell C 60. Steels with physical properties such as this should find wide application for parts where machining costs are high.

Further discussions from the floor brought forth some predictions by Fred Tobias, American Abrasives & Metal Corp., that after the war, powder metallurgy parts made of brass and bronze compositions would meet serious competition from the cold chamber process now being developed by the die casting industry. He also stated that centrifugal castings in the iron and steel class would compete with powder metallurgy parts of high density. He predicted, however, that where quantities were large and shapes were not too complicated, iron and steel parts by powder metallurgy methods could be produced very cheaply.

The last address on the program "How a Solid Metal Fabricator Views Powder Metallurgy," was presented by Dr. D. K. Crampton, Chase Brass and Copper Co. According to the speaker, the production of copper powder does not offer very serious competition to the solid metal fabricator, since less than 1 per cent of the total copper production appears in the form of powder. Reviewing the products manufactured by his company, Dr. Crampton stated that only a very few parts would lend themselves to production by powder methods.

Heavy Caliber Shell Program to Hit Shapes and Semi-Finished Output

By D. C. MacDONALD
Cleveland Regional Editor

Cleveland

• • • **The Army's heavy** caliber shell program has suddenly taken on definite size and aims. The shell steel requirements of the program which currently have been running about 200,000 tons per month have already been stepped up and promise to again be increased to 600,000 tons per month by the end of the year.

The shell steel situation, with only one of the possible increases loaded upon it, has become so tight that many other products are feeling or will soon feel the steel shortage which it will create. Structurals and rails have already felt the bite, and, since the size of the billets required are overloading semi-finished facilities, seamless round mills expect to feel the steel shortage. Rail mills are being converted to roll shell billets in several areas.

One note of relief is that certain mills may be set apart almost strictly for the production of shell steel and in many cases also the finished or forged shell. Kaiser of California has announced a **$25,000,000 contract for** finished shell and will turn nearly half of his steelmaking capacity over to shell steel. This may be complicated somewhat by the proposed increase in troop transport and tanker construction requiring heavy plate tonnage again, possibly from the Kaiser mill for West Coast consumption.

The Republic mill at South Chicago, although built for armor plate production, will be utilized to the maximum of its capacity for shell steel and gun blooms, particularly because of its modern slow cooling facilities and its big bar mills.

Nothing very definite has ever been uncovered on the possibilities of the Geneva Steel plant coming into the

picture, but it has been entered as a possibility. The Sheffield Steel plant in Texas is known to be converting to shell steel and putting in new shell forging equipment.

Steel shortages will be only one of the headaches the War Department must overcome to produce the required shells in the prescribed time. Heavy forging facilities are at a premium and many new lines must be equipped. More than 2000 new shell turning machine tools are yet to be built. Heat treating furnaces, never a drug on the market since the war, must be had in large quantities. Also painting, hot blasting, cleaning, conveying, marking and numerous other items entering into the project, must be obtained. Despite all these apparent difficulties, large scale shell production is being sought by mid-Summer with a high production goal set for early Fall.

The quantity accent is on the 8-in. and five types of the 155-mm. shell. The 240-mm. shell, while being stepped up greatly percentage-wise, will be produced in a relatively limited quantity, as will the 4.5-in.

A new wave of forging equipment purchasing is already beginning to make itself noticeable throughout the country. All of the equipment is of a heavy nature and appears to consist mainly of pierce and draw equipment. Concurrent with this purchasing wave has come some other embracing, heat treating furnaces and heating furnaces of several kinds.

Firms which are reported to be enlarging their forging facilities or adding entirely new facilities include: Bethlehem Steel Co., at Bethlehem, Pa.; Jones & Laughlin Steel Corp., Pittsburgh; Sheffield Steel Co., Texas; Struthers-Wells, Titusville, Pa.; Harrisburg Steel Co., Harrisburg, Pa.; Weirton Steel at Weirton, W. Va.; Tennessee Coal, Iron & Railroad, Birmingham, Ala.; Pullman Standard Car Mfg. Co., Butler, Pa.; Mt. Vernon Car Co., Mt. Vernon, Ill.; The Midvale Co., Nicetown, Pa.; American Car & Foundry and the Watertown Arsenal near Boston. Willys-Overland Motors, Inc., Toledo, Ohio, is also reported to be enlarging present facilities. Henry J. Kaiser's California steel mill is reported adding extensive forging facilities and Colorado Fuel & Iron has also been mentioned. Kaiser will handle much of his $25,000,000 shell contract at Denver, Colo., where the bulk of the finishing work will be done.

MACHINE TOOLS

. . . News and Market Activities

Chafee Addresses Tool Distributors

French Lick, Ind.

• • • **Unexpected demands** of recent weeks have brought home to machine tool distributors the fact their war job is far from over, members of American Machine Tool Distributors' Association were told here last week at their 20th spring meeting.

John S. Chafee, director, Tools Division, War Production Board, defined the problem of getting sufficient machine tools for day-to-day requirements, for Russian needs, for unexpected demands of the various contracts and subcontracts for trucks, larger aircraft engines, and for the artillery, ammunition and other programs which may appear.

"It is obvious that to meet this challenge we must do a continuing and better job in the use and adaptation of available existing equipment," he declared.

Requesting the aid of the distributors in locating idle tools, he said that forms and surveys recently undertaken had turned up less than 10,000 idle machine tools.

On the manufacturing sector, Chafee said that WPB was wrestling with the relation of outside war contracts or subcontracts to machine tool work in the plants of builders. Having given many builders releases of capacity above specific machine tool minimums, the Tools Division now finds a conflict priority-wise between machine tool business and other war work. Complicating the situation, some plants have increased their schedules of other work tremendously, overestimated their ability to produce other work and are faced with lack of manpower to carry out their machine tool production commitments on time. To date the situation is critical in only two or three plants, the Tools Division chief said, but is threatening in others.

He said he did not know whether the manufacturing tangle could be unraveled as situations arose in specific cases or whether a general WPB order would be necessary. Despite pressure from automotive industry, relaxation of Order E-1-b was termed unlikely until the war situation generally permitted diversion of production capacity to civilian goods.

A. G. Bryant, president, Bryant Machinery & Engineering Co., called the attention of the delegates to the problem of obsolescence in dealing with the machine tool surplus. Out of 2,000,000 machine tools in the United States today, only 400,000 are strictly modern, he averred. He decried scrapping and export as panaceas for the industry's postwar problems, urging the surplus machines be retained for production. The distributors' outlook with regard to renegotiation on 1943 orders still required clarification, he said.

A report of the association's arbitration committee, submitted by A. B. Einig, Motch & Merryweather Machinery Co., and setting up a group of principles to govern inter-territorial transactions, was adopted.

Tell Berna, general manager, National Machine Tool Builders' Association, urged that the builders be given prompt notification of impending war programs involving large machine tool requirements, stating that lack of such advance warning had been a handicap in the past.

Ninety per cent of the machine tools for the current shell program now have been ordered, he said. Although the industry passed its peak in new business in March, 1942, and in shipments in December, 1942, it must continue to be prepared for rising fluctuations in its activity chart from time to time such as have just occurred.

Lauding the performance of American weapons in battle, Maj. Gen. L. H. Campbell, Jr., chief of Army Ordnance classed them as "the best machines in the world." Speaking before the banquet meeting, the Ordnance head declared that the country's war machine could never have swung into high gear without tremendous aid from machine tool distributors.

The future of electronic controls in the machine tool field was analyzed by W. R. King and S. D. Fendley, both of General Electric Co. With adjustable speed motor control drives now winning wide acceptance, electronic contour and positioning controls are well above the industrial horizon, King declared. He described continuing and expanding maintenance and educational activities which will keep pace with future new applications, and prophesized a reduction in sales prices as production increases.

Carbide milling of steel was discussed by H. A. Frommelt, Kearney & Trecker Corp., who described recent advances in techniques.

Open Screw Machine Capacity

• • • Manufacturers who are looking for available capacity on screw machines are invited by the National Screw Machine Products Association to take advantage of its clearing house service for such information.

Members of the association are reporting all available capacity together with complete information on tolerances and volume regularly and the association will gladly assist any manufacturer in locating suitable subcontracting facilities for screw machine work.

Inquiries should be addressed to Dept. K, National Screw Machine Products Association, 13210 Shaker Square, Cleveland, 20.

2nd Hand Tool Price Changes

Washington

• • • **OPA on May 20** announced several changes and minor corrections in the listed equivalents and information as to serial numbers of several obsolete machine tools described in the regulation governing prices of second hand machine tools. (MPR 1, Amendment 5.)

These changes and corrections, OPA said, will make it easier to establish applicable ceilings for the machine tools and extras not listed with March 1, 1941 prices in the regulation, in which case specified percentages are applied to the price of the nearest equivalent new machine tool or extra listed.

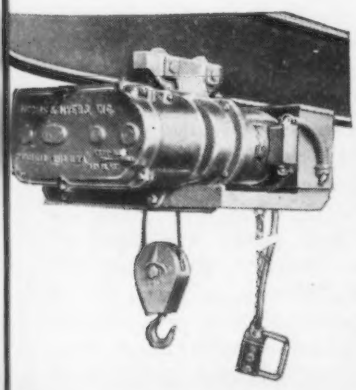
Also, to clarify the original intent of the regulation, provisions dealing with rentals have been changed to state clearly that they apply only to second hand machine tools, attachments and extras.

SHORT OF HANDS?

Ever check the time your workers spend in lifting and carrying the product you make? Glance at your time-study figures. An awful chunk of production time is still being spent in some plants in just moving things around. In these short-handed days, that really hurts.

Make the most of your manpower. By making limited (and often inexperienced) manpower go further, R & M Hoists give you the equivalent of several extra hands. With them, you can move materials faster and easier with fewer men (or women). Here are two of the many R & M Hoists that can do that kind of job.

The R & M Type F Hoist has 1000 — 15,000 - pound capacity. Push-button control is standard. Operating with low headroom and handling loads from any angle with perfect balance, the Type F Hoist makes a one-man job of many otherwise cumbersome operations.



The R & M Type F½ Hoist has 1000 — 2000-pound capacity. It is provided with pendent, push-button control. A step forward in improved design, better materials, and manufacturing economies that provide a better hoist at lower cost in both purchase price and operation.

Get in touch with your nearest R & M Sales and Service Office.

Albany.....364 Broadway
Atlanta.....319 Walton Bldg.
Baltimore, Lombard & Concord St.
Boston.....74 Needham St.
Chicago...2400 W. Madison St.
Cincinnati.....418 New St.
Cleveland. 470 Rockefeller Bldg.
Denver.....1420 16th St.
Detroit.....2921 E. Grand Blvd.
Houston....3715 Harrisburg Blvd.
Jacksonville.....305 Bisbee Bldg.
Kansas City, Mo.....215 Pershing
Los Angeles..149 W. Wash. Blvd.
Meriden, Conn....135 Colony St.
Newark.....700 Bergen St.
New York.....200 Varick St.
Philadelphia....401 N. Broad St.
Pittsburgh....H. W. Oliver Bldg.
Providence.....44 Clifford St.
San Francisco, 116 New Mtgmry St.
Seattle.....216 Walker Bldg.
Syracuse...204 State Tower Bldg.

Montreal....Lyman Tube & Supply Co., Ltd.

ROBBINS & MYERS • INC.

HOIST & CRANE DIVISION • SPRINGFIELD, OHIO

In Canada: Robbins & Myers Co., of Canada, Ltd., Brantford, Ont.

MOTORS • MACHINE DRIVES • FANS • MOYNO PUMPS • FOUNDED 1878

NON-FERROUS METALS

. . . News and Market Activities

Canada's Copper Will Go to U.S.

Toronto

• • • **Canadian lead and zinc** contracts between the British Government and leading producers in this country are being renewed for a year from Sept. 1, while copper contracts are being renewed from Sept. 1 to Dec. 31 this year. However, all contracts are terminable, on three months' notice should the war come to an end. Base metal contracts in this group have remained in force, unchanged regarding price and terms, but adjustable as to costs, since the outbreak of war.

It is reported that all Empire copper producers are being dealt with together in an extension of the British buying arrangement for the last quarter of this year. This will give government authorities to the end of the year to decide the future of the copper buying program in the light of war events, and assures mines the prevailing contract price for the next seven months.

Announcement also is made that some of Canada's copper production is being switched from the United Kingdom to the United States. This shift, however, involves a minimum of 15,000 tons and a maximum of 30,000 tons, for the remainder of the year. No price change is involved. The United Kingdom is said to be well supplied with copper and the United States requires more than its present supply. Already there has been a sharp decline in copper production in Canada and a general slowing down of 10 to 15 per cent is estimated.

Government supplies of zinc and lead also are declining. While there is no immediate shortage of these materials and war plant production is not endangered, it is stated that the authorities would take more of these metals if Canadian mines could supply them.

Contracts with Metals Reserve Co., or commercial deals in the United States are not embraced in the above renewal arrangements, being dealt with separately.

•

Tin Can Salvage Amended

Smelters engaged in the recovery of tin were included in the list of plants that may accept delivery of used tin cans by recent action of the WPB. This action, which will permit a government-owned smelter in Texas City, Tex., to obtain used tin cans for tin recovery, was taken by amending Conservation Order M-325, governing salvage of tinned and detinned scrap.

The amended order provides that no person shall deliver or accept delivery of used tin cans except where delivery is made to or for the account of a municipal department or agency, an official salvage committee, a shredding or detinning plant, a plant engaged in the precipitation of copper, a smelter engaged in the recovery of tin, or a person regularly engaged in the collection of rubbish or trash.

Used tin cans may be delivered to or for the account of any person for reuse in packing any product. The requirement that the person receiving used tin cans must have permission of WPB for such packing is removed in the amended order.

The amended order cancels, as of June 1, 1944, all authorizations to employ used tin cans or tin scrap for the making of bottle crowns. Holders of such authorizations, which were made under Order M-72-a, and continued in Order M-325 when the former was revoked, should apply for new authorizations, under Order M-325 as amended.

•

Al Output Drops in February

• • • **Shipments of nearly** all major forms of fabricated aluminum increased in February, according to figures just released by WPB's Aluminum and Magnesium Division. Primary metal production in the United States dropped, as expected, to 74,400 net tons, 12 per cent below January. Both the previously announced cutback and the short month contributed to this decrease. Secondary recovery of 23,700 net tons was slightly below the January level.

Total aluminum product shipments to consumers amounted to 103,350 net tons, 41 per cent higher than a year ago and 4 per cent lower than the January, 1944, peak. The small decline from January, which occurred despite the increase on most of the major fabricated forms of aluminum, resulted from delayed ingot shipments. New monthly peaks were reached in heat-treated sand castings

ALL THROUGH THE NIGHT: *This mining village, property of the U. S. owned Braden Copper Co., atop a mountain in Chile remains bright all night as the work of mining copper goes on for 24 hr. a day. Copper and nitrates are Chile's main contribution to the war effort.*

REFINER, SMELTER PRICES

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, del'd	15.00
Aluminum, No. 12 Fdy., (No. 2)	12.00
Aluminum, deoxidizing grades	11.00 to 12.25
Antimony, Asiatic, New York	Nominal
Antimony, American, f.o.b. Laredo, Tex.	14.50
Arsenic, prime white, 99%	4.00
Brass, 85-5-5-5 ingots (No. 115)	13.00
Cadmium, del'd	90.00
Cobalt, 97-99% (dollars per lb.)	$2.11
Copper, electro, Conn. Valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Copper, beryllium, 3.75-4.25% Be; dollars per lb. contained Be	$15.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.5%, dollars per troy oz.	$7.50
Iridium, dollars per troy oz.	$165.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9+%, carlots	20.50
Magnesium, 12-in. sticks, carlots	30.00
Mercury, dollars per 76-lb. flask, f.o.b. shipping point or port of entry	$191 to $193.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.67

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.87
Copper, H.R.	....	17.37	....
Copper, drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercal bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	.

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier; 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base. 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 34c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths, 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NON-FERROUS SCRAP METAL QUOTATIONS

(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums)

Copper, Copper Base Alloys

OPA Group 1

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	**8.75**
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	**8.50**
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25

OPA Group 3

Yellow brass soft sheet clippings	8.625
Yellow rod brass turnings	8.375
Zincy bronze borings	8.00
Zincy bronze solids	8.00
Fired rifle shells	8.25
Brass pipe	**7.50**
Old rolled brass	**7.00**
Admiralty condenser tubes	**7.50**
Muntz metal condenser tubes	**7.00**
Plated brass sheet, pipe reflectors	**6.50**
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]
Manganese bronze borings	5.50[2]

OPA Group 4

Automobile radiators	7.00

OPA Group 5

Refinery brass	5.00*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.875
Loose Yellow Brass Trimmings	7.875

Aluminum

Plant scrap, segregated

All S-type alloys (except 2S)	8.50
2S solids	8.00
High grade alloys	7.00
Low grade alloys	6.50
Borings and turnings	
High grade alloys	5.50
Low grade alloys	5.00

Plant scrap, mixed

All solids	6.00
Borings and turnings	4.00

Obsolete scrap

Pure cable	8.00
Old sheet and utensils	7.00
Old castings and forgings	6.50
Pistons, free of struts	6.50
Pistons, with struts	4.50
Old alloy sheet	5.50

For old castings and forgings, pistons, sheets, add ½c. lb. for lots 1000 to 19,999 lb.; for other scrap add 1c.; for lots over 19,999 lb. add 1½c. a lb.

Magnesium

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	8.00

Mixed, contaminated plant scrap

Grade 1 solids	11.00
Grade 1 borings and turnings	7.00
Grade 2 solids	9.00
Grade 2 borings and turnings	5.00

For lots over 1499 lb. add 1c. per lb.

Zinc

New zinc clippings, trimmings	7.25
Engravers', lithographers' plates	7.25
Old zinc scrap	5.75
Unsweated zinc dross	5.80
Die cast slab	5.80
New die cast scrap	4.95
Radiator grilles, old and new	4.95
Old die cast scrap	4.50

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead inc. cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25⅛
Electrolytic, full size	22⅞
cut to size	30⅛
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass: Cast, 82-20, elliptical, 15 in. and longer	23⅝
Zinc: Cast, 99.99, 16 in. and over	16¼
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00–13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz., lots	40.32–41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc cyanide, 100-lb. dms.	33.00
Zinc, sulphate, 89% crystals, bbls.	6.80

Mills Cut Scrap Inventories, Sales Expected to Drop Sharply

New York

• • • **While steel production** is maintaining its high rate of operations and pig iron is becoming slightly tighter in supply, there has been no occurrence of any serious scrap shortages and none seems to be in the offing. In fact, consumers have been and presently are holding back on scrap purchases. Some attribute this holding back on the coming invasion, pointing to the possibility of a quick success and an early end to the war. These observers state that companies are taking no chances on getting caught with heavy inventories in such an event. The low in sales volume for scrap is expected within the next 30 days.

There have been slight declines in the volume of scrap inventories part of the decline has been the result of mill stocks being limited, not through shortages but by design. There is some danger in cutting inventories since a long, drawn-out war in Europe would demand considerably more in the way of armament and weapons than a quick war, placing a heavy drain of steelmaking materials including, of course, scrap.

As the mill stocks have declined, so have yard stock, but for another reason. Scrap yards have been severely hit by the manpower shortages—more so than have most other industries. This has handicapped yards in collections and processing.

As long as war production continues at a high rate there will be a steady stream of production scrap, but should serious cutbacks be made in war production the picture would change. This would accentuate the fact that the small dealers and collectors have long since disappeared, especially if the major supply should shift from production scrap to collected material. Of course, to offset any critical shortage from this score would be the reduced operations in steel that would result.

The expected slump in buying might further hit scrap prices, especially on less desirable grades. Heavy melting grades have been able to consistently draw full price except for a short time in the Philadelphia area, but price conditions on the lighter grades, especially alloys and turnings, might be even worse than they have been in the past three months.

The steel strike at Granite City's St. Louis plant, which ended last Friday, raised havoc with the scrap market in that area. An embargo was placed on shipments and allocated material was held at processing yards while unallocated scrap was diverted. The company's open hearths were expected to be in operation this week, which would ease this situation substantially.

Manpower Is Scarce!

• • • David Feinberg Co., Medford, Mass., handled practically all of the battlefield scrap landed at Boston so far, but is bypassing it these days. He is down to 12 men in his yard, contrasted with 180, the normal employment. He operates a small smelter, making battery lead pigs for the Navy. This lead is used in submarines. The smelter goes 24 hr. per day, and there is a nice bit of change in it for Feinberg, another reason why he is not interested in battlefield scrap just now.

•

BIRMINGHAM—A market for considerable tonnages of shipyard scrap in the South is reported hard to find because the inventories of electric furnace operators are plentiful and the operators do not desire to pay high freight rates from shipyards to consuming points. Demand for open hearth grades has shown a slight slackening.

•

CINCINNATI—The market seems to be in a pretty steady condition, with little or no features present. While consumers generally are accepting scrap at ceiling prices with relatively no pressure for a reduction, there is some definite resistance toward "springboard prices." And, of course, the industries generally continue to refuse to pay the additional freight rate to bring in remote material. With the exception of one local mill, consumers generally are accepting good scrap on contract, but are not overstocking because of the present tendency to keep inventories at a conservative level.

•

CLEVELAND—Alloy scrap surpluses are reported growing steadily with demand falling to new lows. Electric furnace scrap movement has been slightly more brisk recently as has blast furnace turnings. Greater attention to segregation is being urged by buyers of plain carbon scrap.

•

BOSTON—Occasionally a yard reports increased shipments, but shortage of labor remains the big curtailing factor. Improvement is noted in heavy melting steel movement. Trade reports a ready sale for most everything except alloy scrap, which is a drug on the market. The scarcity of breakable and cupola cast is critical with some foundries. Brokers say it is a little harder to get turnings. Presumably yards are less interested in them because of alloy content rejections.

•

BUFFALO—Improvement continues in local mill supplies with the arrival of an additional fleet of barges from seaboard and a steamer load of heavy melting steel from the midwest. Despite announcement by the district's leading consumer he would place no new business for turnings, some dealers asserted they were not overly burdened with the troublesome stuff. The hunt for cast scrap continues with poor results.

TENSE MOMENTS: *Crew of 240 mm. howitzer take position around gun as firing mechanism is released somewhere on the Italian front. Under camouflage net, crew has ample space to perform all duties necessary to operation of big mobile weapon.*

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES				ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES									
							Low Phos.	Heavy Structural and Plate			Foundry Steel					
	No. 1 & 2 Hvy. Melt. No. 1 Cp. Blk. Shts. No. 1 & 2 Bundles	Unbaled* Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shoveling Turnings	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$15.00	$15.00	$16.00	$17.00	$17.50	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85
Toledo, Ohio	....	12.85	12.85	13.85	14.85	15.35	....	....	....	....	....	....	....	....	....	....	....
St. Louis, Mo.	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles, Pittsburg, Cal; San Francisco	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.50	15.50	12.50	14.00	15.50

* Baled turnings are $5 per gross ton higher.

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles; No. 3 bundles are $2 less than No. 1 heavy melting.

AT NEW YORK CITY or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on trucks. Minimum set at $14 per gross ton at any shipping point in U. S. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.66 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing point (cents per gross ton) are: Chicago, 84c.; Pittsburgh, Brackenridge, 55c.; Detroit, 53c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, Pittsburg, 42c.; Seattle, 38c.; Buffalo, Claymont, Harrisburg, 86c.; Atlanta, Birmingham, 32c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Phoenixville, Bethlehem, Kokomo, Duluth and St. Louis, 28c.; Alabama City, Ala., 26c.; Minnequa, Colo., 22c.; Middletown, 14c.; Conshohocken, Sparrows Point, 11c.

*Basic open hearth and foundry grades, and auto springs and crankshafts, deduct 80c. per ton.

BASING POINT includes switching districts of city named.

Basing point	Switching districts:
Pittsburgh	Bessemer, Homestead, Duquesne, Munhall, McKeesport
Cincinnati	Newport
St. Louis	Granite City, E. St. Louis, Madison, Ill.
Chicago	Gary
Claymont	Chester, Pa.
San Francisco	So. San Francisco, Niles, Oakland

MAXIMUM SHIPPING POINT PRICE: Where shipment is wholly or partially by rail or vessel, or combination of rail and vessel, the scrap is at shipping point when placed f.o.b. railroad or f.a.s. vessel. For motor vehicle shipments scrap is at shipping point when loaded. Then maximum shipping point price shall be: (a) For shipping point located within a basing point, prices shown in above table for scrap at basing point in which shipping point is located, minus applicable switching charge deduction shown in paragraph above labeled "Switching Charges." (b) For shipping points outside basing point, price listed in above table hereof for scrap at most favorable basing point, minus lowest charge for transportation from shipping point to such basing point by rail or water carrier or combination. Where vessel movement is involved, in lieu of established dock charge or any cost customarily incurred at the dock, 75c. per ton must be included as part of deduction in computing shipping point price; 50c. at Memphis; $1 at Great Lakes ports; and $1.25 at New England ports. If no established transportation rate exists for a portion of movement from shipping to basing point, actual charge or cost customarily incurred by shipper in such portion of movement shall be included as part of deduction in computing shipping point price. For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less than maximum prices for the corresponding prepared scrap. In no case, however, shall electric furnace, acid open hearth and foundry grades be used as the corresponding prepared scrap. A preparation-in-transit charge for unprepared scrap is provided.

NEW LISTED GRADES: Priced in dollars per gross ton less than No. 1 heavy melting steel. Pit scrap, ladle skulls, slag reclaim, etc., of 85% or more Fe priced less $2; 75 to 85% Fe less $4; under 75% Fe less $8 per ton. Mill scale less $8 per ton. Mill cinder and grindings, shipping point maximum price of $4 per gross ton at all U. S. shipping points.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1% oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5% oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c. mill scale, $8 less than No. 1 heavy melting.

Tool Steel Scrap Prices (MPR 379)

	SEGREGATED Solids Per Lb. Cont. W	SEGREGATED Turnings Per Lb. Cont. W	UNSEGREGATED SOLIDS	UNSEGREGATED TURNINGS
Type 1. 12% min. W, 1% max. Mo	$1.80	$1.60	$1.50 per lb. contained W if 5% or more.	$1.30 per lb. contained W if 5% or more.
Type 2. 5 to 12% W, 1% max. Mo	1.60	1.40	$1.15 per lb. contained W if 1 to 5%.	$1.00 per lb. contained W if 1 to 5%.
Type 3. 1 to 5% W, 1.5% max. Mo	1.25	1.25	$0.80 per lb. contained Mo if 1.5% or more.	$0.70 per lb. contained Mo if 1.5% or more.
*Type 4. 7% min. Mo, 2% max. W	0.125	0.105	If both W and Mo are within ranges, payment may be for both W and Mo content.	
*Type 5. 3.5 to 8% Mo, 4.5 to 8% W	0.135	0.115		

*Per lb. of scrap material.

If segregated, a premium of $1.50 per lb. of contained Co allowed if Co content is 3% or over. No scrap considered segregated if Co content ranges between 0.5 and 3%.

If Cu or Ni content over 0.25%, price shall be reduced by 50%.

If 500 lb. or less is sold, either segregated or unsegregated, price shall be reduced 2c. per lb. of scrap material.

Cast Iron Scrap

Maximum on-line price, per gross ton, for any of the following cast grades will be the price shown at the highest priced zone in which the railroad operates or is located.

	Per Gross Ton		
	Zone A	Zone B	Zone C
Cast Iron, No. 1	$18.00	$19.00	$20.00
Cast Iron, No. 2	17.00	18.00	19.00
Cast Iron, No. 3	14.50	15.50	16.50
Cast Iron, No. 4	13.25	14.25	15.25
Cast Iron Brake Shoes	13.25	14.25	15.25
Malleable	20.00	21.00	22.00
Wheels, No. 1	18.00	19.00	20.00

Zone A includes Mont., Idaho, Wyo., Nev., Utah, Ariz., and N. M. Zone B includes N. D., S. D., Neb., Colo., Kan., Okla., Texas, and Fla. Zone C includes all states not named in zones A and B, and includes switching district of Kansas City, Kansas-Missouri.

For cast, an in-transit preparation fee will be applicable only for preparing Cast ron No. 3 into Cast Iron No. 1, for which the maximum preparation fee shall be $3.50 per gross ton. (Previous dealer fee was $2.50.)

CAST IRON GRADE DEFINITIONS: Cast Iron No. 1—Cast Iron scrap such as columns, pipe, plates and/or castings of miscellaneous nature, but free from stove plate, brake shoes, and/or burnt scrap. Must be cupola size not over 24 x 30 in. and no pieces to weigh more than 150 lb. Free of foreign material. No. 2—Cast iron scrap in pieces weighing over 150 lb. not more than 500 lb. and free from burnt cast. No. 3—Cast iron scrap in pieces over 500 lb., includes cylinders, driving wheel centers, and/or all other castings. Free from hammer blocks or bases. No. 4—Burnt cast iron scrap such as grate bars, stove parts, and/or miscellaneous burnt scrap. No. 5—Driving and/or car brake shoes of all types except composition filled. Malleable—Malleable parts of automobiles, railroad cars, and locomotives. No. 7—Wheels, No. 1, includes cast iron car and/or locomotive wheels.

Comparison of Prices . . .

Advances Over Past Week in Heavy Type; Declines in *Italics*. [Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	May 30, 1944	May 23, 1944	April 25, 1944	June 1, 1943
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs, rerolling	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	May 30, 1944	May 23, 1944	April 25, 1944	June 1, 1943
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.84	$25.89
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	25.11	25.11	25.11	24.68
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.39
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	37.34	37.34	37.34	31.34
Ferromanganese‡	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)	May 30, 1944	May 23, 1944	April 25, 1944	June 1, 1943
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$7.00	$7.00	$7.00	$6.50
Foundry coke, prompt	8.25	8.25	8.25	7.50
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 147-155.

Composite Prices . . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
May 30, 1944	2.25513c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.25513c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.25513c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26190c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton

	HIGH	LOW	HIGH	LOW	HIGH	LOW
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 8
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

. . . Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per lb. under base; primes 25c. above base. (2) Unassorted 8-lb. coating. (3) Widths up to 12-in. (4) 0.25 carbon and less. (5) Applise to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50c. (14) This base price to be used in figuring annealed, bright finish wires, commercial spring wire.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	[10] Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
Hot Rolled Sheets	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold Rolled Sheets[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized Sheets (24 gage)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling Sheets (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long Ternes[2]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
Hot Rolled Strip[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold Rolled Strip[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢	3.16¢	
Cooperage Stock Strip	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R Strip	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢	3.31¢	
Coke Tin Plate, Base Box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
.50 Electro Tin Plate, Box	$4.50	$4.50	$4.50						$4.60						
.75 Electro Tin Plate, Box	$4.65		$4.65						$4.75						
Black Plate (29 gage)[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[12]			3.37¢
Mfg. Ternes, Special Box	$4.30	$4.30	$4.30						$4.40						
Carbon Steel Bars	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail Steel Bars[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (Billet) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢[13]	2.25¢	2.39¢	
Reinforcing (Rail) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	c2.55¢[13]	2.25¢		2.47¢
Cold Finished Bars[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢		(Detroit = 2.70¢)		(Toledo = 2.80¢)				2.99¢	2.97¢
Alloy Bars, Hot Rolled	2.70¢	2.70¢				2.70¢	(Bethlehem, Massillon, Canton = 2.70¢)						2.80¢		
Alloy Bars, Cold Drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
Carbon Steel Plates	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	(Coatesville and Claymont = 2.10¢) 2.10¢	2.35¢		2.45¢	2.65¢	2.32¢	2.29¢	2.15¢
Floor Plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy Plates	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.95¢	4.15¢		3.70¢	3.59¢
Structural Shapes	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem = 2.10¢)				2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R 0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
Bright Wire[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)		(Duluth = 2.65¢)			3.10¢			2.92¢
Galvanized Wire	Add proper size extra and galvanizing extra to Bright Wire base.														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.70¢			3.52¢
Steel Sheet Piling	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

EXCEPTIONS TO PRICE SCHED. NO. 6

Slabs—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. $34 Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel Co. $47.50.

Blooms—Phoenix Iron Co. (rerolling) $41, (forging) $47.

Sheet Bar—Empire Sheet & Tin Plate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.
basing pts.; Follansbee Steel Corp. $49.50

Billets, Forging—Andrews Steel Co. $50 Toronto; Phoenix Iron Co. $47.00 mill.

Billets, Rerolling—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. (small) $36 Portsmouth, Ohio; (blooming mill sizes) applicable base, f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2) $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.69 Birmingham; Ford Motor Co. $34 Dearborn, Mich.

Structural Shapes—Phoenix Iron Co. $2.35 basing pts. (export) $2.50 Phoenixville; Knoxville Iron Co. $2.30 basing points.

Bar Size Shapes—(Angles) W. Ames & Co., 10 tons or over, $3.10 mill.

Rails—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp., $45 Pueblo.

Hot Rolled Plate—Granite City Steel Co. $2.65 mill; Knoxville Iron Co. $2.25 basing pts.; Kaiser Co. $3.20 Pacific Ports; Central Iron & Steel Co. $2.50 basing points; Granite City Steel Co. $2.35 Granite City.

Merchant Bars—W. Ames Co., 10 tons and over, $2.85 mill; Eckels-Nye Steel Corp., $2.50 basing pts. (rail steel) $2.40; Phoenix Iron Co. $2.40 basing pts.; Sweet Steel Co. (rail steel) $2.35 mill; Joslyn Mfg. & Supply Co., $2.35 Chicago; Calumet Steel Dic., Borg Warner Corp. (8 in. mill bars) $2.35 Chicago; Knoxville Iron Co. $2.30 basing pts. Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill.

Reinforcing Bars—W. Ames & Co., 10 tons and over, $2.85 mill; Sweet Steel Co. (rail steel) $2.35 mill; Columbia Steel Co. $2.50 Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation. Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Massfield, Mass., f.o.b. Massfield; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight ville; Medart Co. in certain areas, Chi-Buffalo to Readville, Mass. f.o.b. Readcago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co. for delivery except Texas and Okla. Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co. shipped outside Ala., Mississippi, Louisiana, Georgia, Florida, Tenn., Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co. $2.30 Chicago; Knoxville Iron Co. $2.25 basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base on shipments to Detroit or area; Parkersburg Iron & Steel Co., $2.25 Parkersburg.

Galvanized Sheets—Andrews Steel Co., $3.75 basing pts.; Parkersburg Iron & Steel Co. $3.85 Parkersburg; Apollo Steel Co. $3.75 basing pts.; Continental Steel Co., Middletown base on Kokomo, Ind., product; Superior Sheet Steel Co., Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

Black Sheets—Empire Sheet and Tinplate Co., maximum base price mill is $2.45 per 100 lb., with differentials, transportation charges, etc., provided in RPS. No. 6.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendments to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
**Philadelphia	3.518	4.872[8]	5.018[a]	3.922	4.772	3.605	3.666	3.822	4.072	5.966	7.066	7.272	8.322
New York	3.590	4.613[3]	5.010	3.974[6]	4.772	3.768	3.758	3.853	4.103	6.008	7.108	7.303	8.353
Boston	3.744	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.262	7.344	8.394
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165	....	....	....	....
Chicago	3.25	4.20	5.231	3.60	4.65[17]	3.55	3.55	3.50	3.75	5.75	6.85	6.85	7.90
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.887	5.987	7.087	7.087	8.137
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.056	6.85	7.90
Buffalo	3.35	4.40	4.754	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.85	6.85	7.90
Detroit	3.45	4.50	5.004	3.70	4.659[17]	3.609	3.661	3.45	3.80	6.08	7.18	7.159	8.209
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
St. Louis	3.397	4.347[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.031	6.131	7.231	7.231	8.281
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	6.85	6.85	7.90
St. Paul	3.51	4.46	5.257[4]	3.86	4.35[17]	3.811[3]	3.811[3]	3.761[3]	4.361	6.09	7.19	7.561	8.711
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.43	....	....	....	....
Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.98	6.08	7.18	7.18	8.23
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.43	....	....	....	....
Memphis	3.965[7]	4.66	3.265	4.215	....	4.065	4.065	4.015	4.33	....	....	....	....
New Orleans	4.058*	4.95	5.358	4.308	....	4.158	4.158*	4.108*	4.629	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.373[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.203	6.104	4.95	5.613[15]	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.55[14]	7.304	6.354	4.50[14]	7.333[17]	4.65[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.054	5.954	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.783	....	9.404	....	....
Portland	4.65[11]	6.604	5.754	4.75[11]	....	4.75[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.53[17]	....	6.17[18]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	5.90	....	....	....	....

NATIONAL EMERGENCY (N. E.) STEELS

(Hot Rolled Mill Extras for Alloy Content)

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar-Strip	Billets, Blooms and Slabs	Bars and Bar-Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35				.10c	$2.00		
NE 1335	.33/ .38	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1345	.43/ .48	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1350	.48/ .53	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25c	$25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8620	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8635	.33/ .38	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8637	.35/ .40	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8640	.38/ .43	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8642	.40/ .45	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8645	.43/ .48	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8650	.48/ .53	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.20/ .30	.80	16.00	1.30	26.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20				.40	8.00		
NE 9260	.55/ .65	.70/1.00	.040	.040	1.80/2.20				.40	8.00		
NE 9261	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.10/ .25			.65	13.00		
NE 9262	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.25/ .40			.65	13.00		
NE 9415	.13/ .18	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9420	.18/ .23	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9425	.23/ .28	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9430	.28/ .33	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9437	.35/ .40	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9440	.38/ .43	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9450	.48/ .53	1.20/1.50	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9537*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9540*	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9542*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9545*	.43/ .48	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9550*	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00

*Recommended for large sections only. Note: The extras shown are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.

Base Quantities

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1499 lb.; strip, extras on all quantities; bars, 1500 lb. base; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb. and over. (15) 1000 lb. and over. (16) 1500 lb. and over. (17) 2000 lb. and over. (18) 3500 lb. and over.

(a) Philadelphia: Galvanized sheets, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271c. for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports**)

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

PRICES

SEMI-FINISHED STEEL

Ingots, Carbon, Rerolling

Base per gross ton, f.o.b. mill.... $31.00
Exceptions: Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast Ports; Empire Sheet & Tinplate Co., $34.25.

Ingots, Carbon, Forging

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00
Exceptions: Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports.

Ingots, Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Coatesville, Chicago, Massillon, Pittsburgh $45.00
Exceptions: C/L delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Delivered prices do not reflect three per cent tax on freight rates.

Per Gross Ton

Rerolling $34.00
Forging quality 40.00
For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

Alloy Billets, Blooms, Slabs

Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton 54.00
Price delivered Detroit $2.00 higher; E. Michigan $3.00 higher.

Shell Steel

Per Gross Ton

8 in. to 12 in..... $52.00
12 in. to 18 in..... 54.00
18 in. and over..... 56.00
Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.
Prices delivered Detroit are $2.00 higher; E. Michigan, $3 higher.
Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.

Per Gross Ton

Open hearth or bessemer $34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

Per Lb.

Grooved, universal and sheared ... 1.90c.

Wire Rods

(No. 5 to 9/32 in.)

Per Lb.

Pittsburgh, Chicago, Cleveland ... 2.00c.
Worcester, Mass. ..... 2.10c.
Birmingham ..... 2.00c.
San Francisco ..... 2.50c.
Galveston ..... 2.25c.
9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

Base per lb.

High speed ..... 67c.
Straight molybdenum ..... 54c.
Tungsten-molybdenum .....57½c.
High-carbon-chromium ..... 43c.
Oil hardening ..... 24c.
Special carbon ..... 22c.
Extra carbon ..... 18c.
Regular carbon ..... 14c.
Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

PRICES

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$2.00 per Net Ton

	Black	Galv.
Steel (Butt Weld)		
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½
Wrought Iron (Butt Weld)		
½ in.	24	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18
Steel (Lap Weld)		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
Wrought Iron (Lap Weld)		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
Steel (Butt, extra strong, plain ends)		
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57
Wrought Iron (Same as Above)		
½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½
Steel (Lap, extra strong, plain ends)		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
Wrought Iron (Same as Above)		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger are $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

		Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld, Hot Rolled
2	in. o.d. 13 B.W.G.	15.03	13.04	12.38
2½	in. o.d. 12 B.W.G.	20.21	17.54	16.58
3	in. o.d. 12 B.W.G.	22.48	19.50	18.38
3½	in. o.d. 11 B.W.G.	28.37	24.62	23.18
4	in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft., and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	Pacific Coast Basing Points†
	Base per Keg	
Standard wire nails	$2.55	$3.05
Coated nails	2.55	3.05
Cut nails, carloads	3.85	....
	Base per 100 Lb	
Annealed fence wire	$3.05	$3.55
Annealed galv. fence wire	3.40	3.90
	Base Column	
Woven wire fence*	$0.67	$0.85
Fence posts, carloads	.69	.86
Single loop bale ties	.59	.84
Galvanized barbed wire**	.70	.80
Twisted barbless wire	.70	....

*15½ gage and heavier. **On 80-rod spools in carload quantities.
†Prices subject to switching or transportation charges.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:
Base discount less case lots

	Per Cent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:
(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 in. to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 per cent additional discount.

Stove Bolts — *Consumer*
Packages, nuts loose ..... 71 and 10
In packages, with nuts attached 71
In bulk 80
On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland Chicago, New York on lots of 200 lb. or over.

Large Rivets
(½ in. and larger)
Base per 100 lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham $3.75

Small Rivets
(7/16 in. and smaller)
Per Cent Off List
F.o.b. Pittsburgh, Cleveland Chicago, Birmingham ..... 65 and 5

Cap and Set Screws — *Consumer Per Cent Off List*
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in. 64
Upset set screws, cup and oval points 71
Milled studs 46
Flat head cap screws, listed sizes 36
Fillister head cap, listed sizes 51
Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
30-lb. coating I.C.	7.50	15.00

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston	*$25.50*	*$25.00*	*$26.50*	*$26.00*	.....	.....
Brooklyn	*27.50*	*27.00*	.....	*28.00*	.....	.....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	.....	.....
Philadelphia (4)	*25.84*	*25.34*	*26.84*	*26.34*	*$30.74*	.....
Bethlehem, Pa.	25.00	24.50	26.00	25.50	.....	.....
Everett, Mass.	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	29.50	.....
Birdsboro, Pa. (3)	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa. (1)	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.50	25.00	24.50	29.50	.....
Cincinnati, Ohio	*25.11*	*24.61*	.....	*25.11*	.....	.....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	.....
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	.....
St. Louis	*24.50*	*24.50*	.....	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	*35.46*	.....*$37.34*
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	*32.42*	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown	24.00	23.50	24.50	24.00	*32.42*	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	34.00
Lyles, Tenn. fc. (2)	.....	.....	.....	.....	.....	33.00
St. Paul	*26.63*	26.13	*27.13*	*26.63*	*39.80*	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	.....	.....	.....
Los Angeles	*26.95*	.....	.....	.....	.....	.....
San Francisco	*26.95*	.....	.....	.....	.....	.....
Seattle	*26.95*	.....	.....	.....	.....	.....
Provo, Utah	22.00	21.50	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

'RAY FORGE IRON: Valley or Pittsburgh furnace $23.50

(1) Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable. Struthers Iron and Steel Co. may add another $1.00 per gross ton for iron from Struthers, Ohio, plant.

(2) Price shown is for low-phosphorous iron; high phosphorous sells for $28.50 at the furnace.

(3) E. & G. Brooke Co. Birdsboro, Pa., permitted to charge $1.00 per ton extra.

(4) Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 to 2.25 per cent); Phosphorus differentials, a reduction of 38c. per ton for phosphorus content of 0.70 per cent and over; Manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, c. per lb., ton lots.

Copper, electrolytic, 150 and 200 mesh	21⅛ to 23½c.
Copper, reduced, 150 and 200 mesh	20½ to 25½c.
Iron, commercial, 100 and 200 mesh, 96 + % Fe	13½ to 15c.
Iron, crushed, 200 mesh and finer, 90 + % Fe	4c.
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe	63c.
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42c.
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90c.
Aluminum, 100 and 200 mesh	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.03
Lead, 100, 200 & 300 mesh, 11½ to 12½c.	
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh, 8½c. plus metal	
Tin, 100 mesh	58¾c.
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Molybdenum power, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00

*Freight allowed east of Mississippi.

COKE

	Net Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$7.00*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	8.25
Foundry, By-Product	
Chicago, del'd	13.35
Chicago, f.o.b.	12.60
New England, del'd	14.25
Kearny, N. J., f.o.b.	12.65
Philadelphia, del'd	12.88
Buffalo, del'd	13.00
Portsmouth, Ohio, f.o.b.	11.10
Painesville, Ohio, f.o.b.	11.75
Erie, del'd	12.75
Cleveland, del'd	12.80
Cincinnati, del'd	12.85
St. Louis, del'd	13.85
Birmingham, del'd	10.50

*Hand drawn ovens using trucked coal permitted to charge $7.75 per ton plus transportation charges. **Mo., Ala., and Tenn. producers—$13.35.

PRICES

REFRACTORIES
(F.o.b. Works)

	Per 1000
Fire Clay Brick	
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60
Silica Brick	
Pennsylvania and Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00
	Per Net Ton
Chrome Brick	
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$54.00
Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00
Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.48
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

RAILS, TRACK SUPPLIES
(F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$40.00
Angle splice bars, 100 lb.	2.70
(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00
	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

CORROSION AND HEAT-RESISTING STEEL
(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

ELECTRICAL SHEETS
(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

PRICES

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Bethlehem, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Carload lots (packed)	141.00
Less ton lots (packed)	148.50

Premium, $1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Manganese Metal

Contract basis, lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	36c.
L.c.l. lots	38c.

95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. Fe.

Carload, bulk	34c.
L.c.l. lots	35c.

Spiegeleisen

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
50% Si	6.65c.	7.10c.	7.25c.
75% Si	8.05c.	8.20c.	8.75c.
80-90% Si	8.90c.	9.05c.	9.55c.
90-95% Si	11.05c.	11.20c.	11.65c.

Spot sales add: .45c. per lb. for 50% Si, .3c. per lb. or 75% Si .25c. per lb. for 80-90% and 90-95% Si.

Silvery Iron

(Per Gross Ton, base 6.00 to 6.50 Si)

F.o.b. Jackson, Ohio	$29.50*
Buffalo	30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphoros or over.

*OPA price established 6-24-41.

Bessemer Ferrosilicon

Prices are $1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe.	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe.	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	3.35c.	3.50c.	3.65c.
2000 lb.-carload	3.8c.	4.2c.	4.25c.

Silicomanganese

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05c.
2000 lb. to carload	6.70c.
Under 2000 lb.	6.90c.
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.
2000 lb. to carload	6.30c.
Less ton lots	6.55c.

Ferrochrome

(65-72% Cr, 2% max. Si)

OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

	Eastern Zone	Central Zone	Western Zone
0.06% C	23.00c.	23.40c.	24.00c.
0.10% C	22.50c.	22.90c.	23.50c.
0.15% C	22.00c.	22.40c.	23.00c.
0.20% C	21.50c.	21.90c.	22.50c.
0.50% C	21.00c.	21.40c.	22.00c.
1.00% C	20.50c.	20.90c.	21.50c.
2.00% C	19.50c.	19.90c.	21.00c.
66-71% Cr, 4-10% C	13.00c.	13.40c.	14.00c.

Other Ferroalloys

Ferrotungsten, Standard grade, lump or ¼X down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten, 10,000 lb. or more... $1.90

Ferrovanadium, 35-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per usual freight allowances, per lb. contained Va.
- Open Hearth $2.70
- Crucible $2.80
- Primos $2.90

Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal $1.50

Vanadium pentoxide, 88%-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5. Spot sales add 5c. per lb. contained V_2O_5 ..... $1.10

Ferroboron, contract basis, 17.50% min. Bo, f.o.b. producer's plant with usual freight allowances, per lb. of alloy.
- 2000 lb. to carload $1.20
- Under 2000 lb. 1.30

Silcaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval)
- Carload lots ..... 25c.
- 2000 lb. to carload ..... 26c.

Silvaz No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval)
- Carload lots ..... 58c.
- 2000 lb. to carload ..... 59c.

Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis
- No. 1 ..... 87.5c.
- No. 6 ..... 60c.
- No. 79 ..... 45c.

Bortram, f.o.b. Niagara Falls
- Ton lots, per lb. ..... 45c.
- Less ton lots, per lb. ..... 50c.

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb. contained Cb.
- 2000 lb. lots $2.25
- Under 2000 lb. lots..... $2.30

Ferrotitanium, 40%-45%, f.o.b. 0.10c. max. Niagara Falls, N. Y., ton lots, per lb. contained Ti.. $1.23
- Less ton lots $1.25

Ferrotitanium, 20%-25%, 0.10 C max., ton lots, per lb. contained titanium $1.35
- Less ton lots $1.40

High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per carload $142.50

Ferrophosphorus, 18% electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equaled with Rockdale, Tenn., per gross ton $58.50

Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton $75.00

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per lb. contained Mo. 95c.

Calcium molybdate, 40%-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo ..... 80c.

Molybdenum oxide briquetes, 48%-52% Mo, f.o.b. Yangeloth, Pa., per lb. contained Mo ..... 80c.

Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo ..... 80c.

Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add ¼c. for spot sales
- Carload lots ..... 14c.

Zirconium, 12-15%, contract basis, lump, f.o.b. plant usual freight allowances, per lb. of alloy
- Carload, bulk ..... 4.6c.

Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk ..... 5.75c.
- Ton lots ..... 7.25c.

Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.
- Car lots ..... 8.75c.
- Ton lots ..... 9.25c.

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NEW YORK STATE

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